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# MACHINERY

Index to Volume XLII  
September 1935—August 1936

1936  
THE INDUSTRIAL PRESS  
140-148 Lafayette St.  
New York



# MACHINERY

## *Design—Construction—Operation*

Volume 42

SEPTEMBER, 1935

Number 1

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**What is Shot Welding**  
When a process is of sufficient importance to be used in fabricating a million pounds of stainless steel yearly by one company alone—and when that process is used for the most exacting welding reliability for airplanes, streamline trains, automotive equipment, and ships, then the engineer engaged in any line of manufacture wants to get the facts about the fundamental principles of that process. The first comprehensive article on the new Shot-weld process will be published in October MACHINERY.

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**Alphabetical Index 257-258**

PUBLISHED MONTHLY BY  
**THE INDUSTRIAL PRESS**  
148 Lafayette Street New York  
ROBERT B. LUCHARS.....President  
EDGAR A. BECKER.....Vice-pres. and Treasurer  
ERIK OBERG.....Editor  
FRANKLIN D. JONES.....Associate Editor  
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LONDON: 52-54 High Holborn  
PARIS: 15 Rue Bleue

YEARLY SUBSCRIPTION: United States and Canada, \$3 (two years, \$5); foreign countries, \$6. Single copies, 35 cents. Changes in address must be received by the fifteenth of the month to be effective for the forthcoming issue. Send old as well as new address.

Copyright 1935 by The Industrial Press. Entered as second-class mail matter, September, 1894, at the Post Office, New York, N. Y., under the Act of March 3, 1879. Printed in the United States of America.

THE SHOW NUMBER

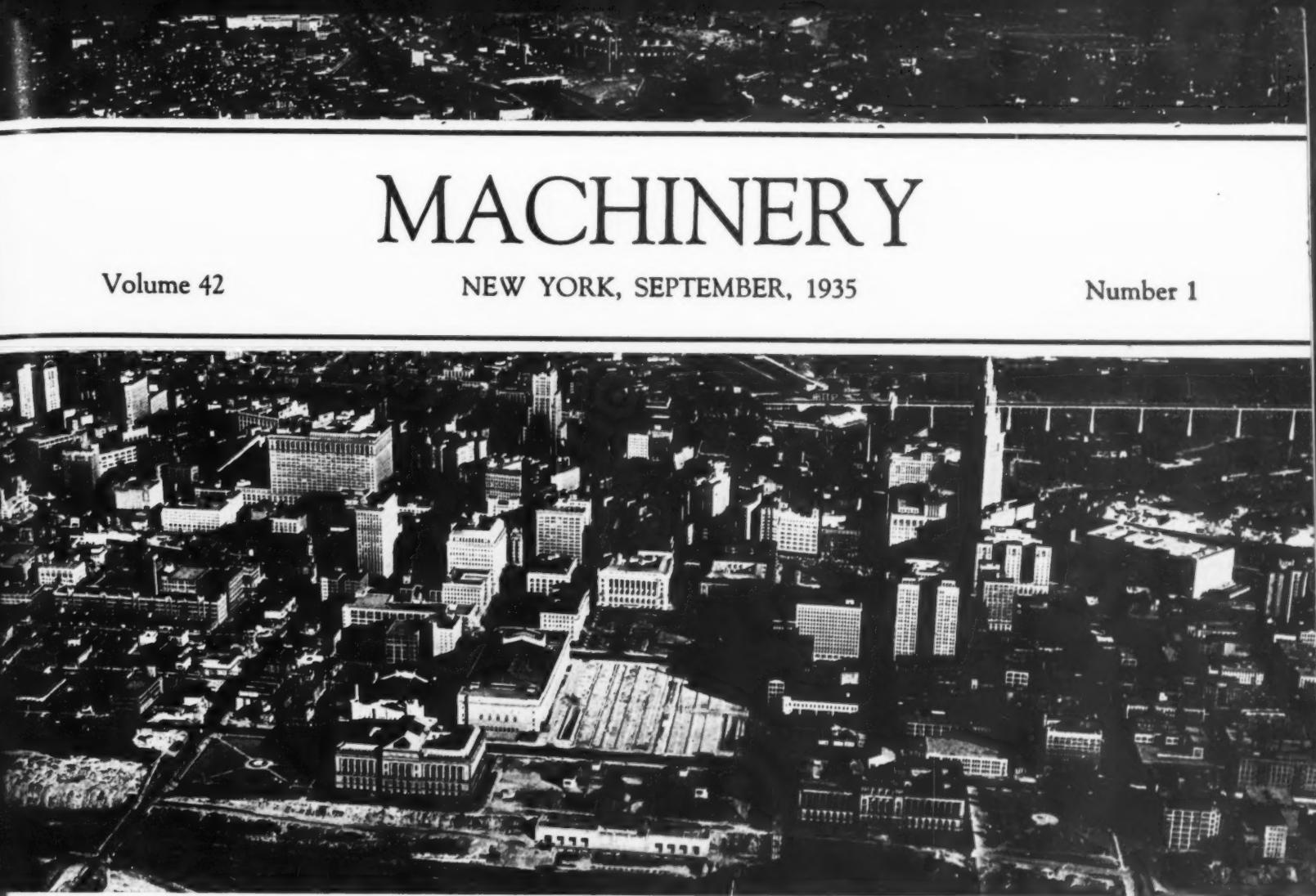
# HAWAII



AT THE  
MACHINE TOOL  
SHOW  
CLEVELAND  
SEPTEMBER 11-21

*Be sure to see our complete  
exhibit at Booth No. 1018.*

# LODGE &



# MACHINERY

Volume 42

NEW YORK, SEPTEMBER, 1935

Number 1

## *The National Machine Tool Exposition in Cleveland*

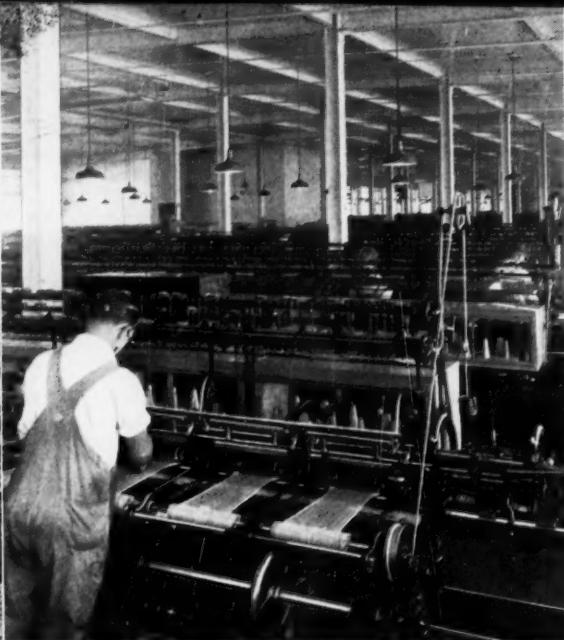
ON September 11, in the Cleveland new Exposition Hall and Public Auditorium, the curtain rises on the third National Machine Tool Exposition, held under the auspices of the National Machine Tool Builders' Association—the largest industrial exposition ever held in the United States.

This Exposition, which will be open for ten days, marks a milestone in the history of the machine tool building and machine tool using industries. It is a symbol of the industrial progress of America. Here are assembled the latest designs of the most efficient machines available for obtaining increased production and accuracy in machine shop operations. These machines are the foundation on which rests the continued progress of the nation's industries, for these are the machines that build all other machines—the machines that make possible the production of all the goods, comforts, and services

that together make what is known as the "American standard of living."

There will be over 240 exhibits at the Show, occupying 250,000 square feet—all the available exhibit space of the huge Cleveland Public Auditorium. There will be more than 900 machine tools on exhibit, practically every one in operation. The visiting manufacturing executives and engineers will have an opportunity to see all these machines actually at work. In fact, the Exposition will be one vast machine shop, the equipment of which has no equal in the world. Some 6000 horsepower will be required to drive this great shop.

When the first Machine Tool Show held under the auspices of the National Machine Tool Builders' Association was staged in Cleveland in 1927, MACHINERY referred to the Exposition as "the best equipped machine shop in the world," a designation that proved to be no exaggeration. But it will



## BACK OF ALL ENGINEERING PROGRESS, BACK OF

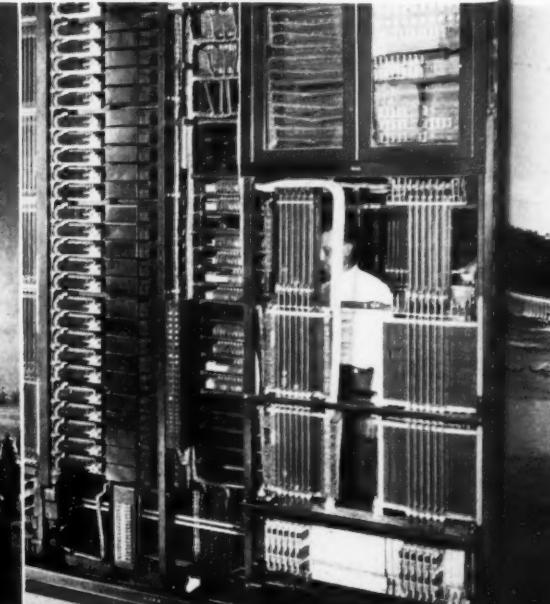
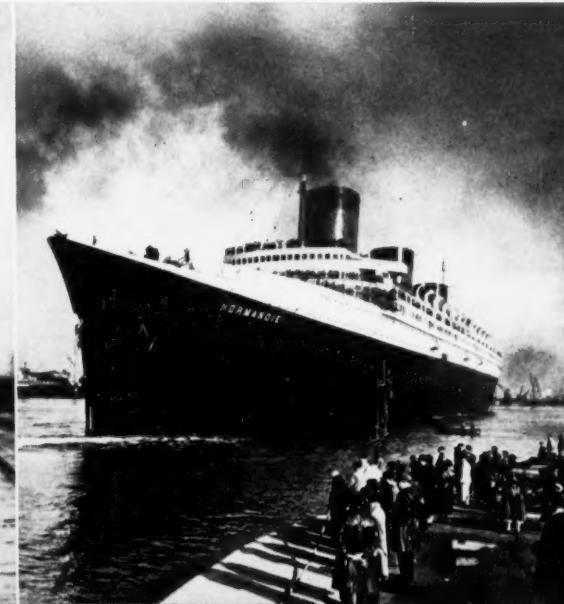
apply even more fittingly to the present great Show, for it will at once become evident to every visiting engineer that here are expressed, as nowhere else, the latest ideas of machine tool manufacturers and engineers. Not only will the number of exhibits be greater than at any former Exposition, but the number of entirely new machines will far exceed that of former shows.

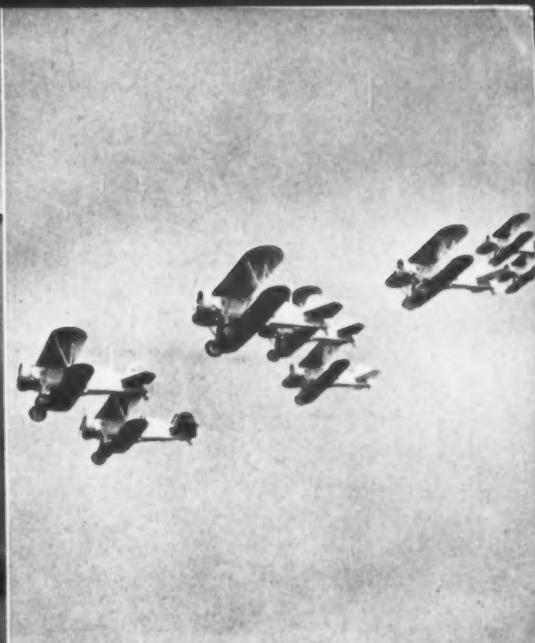
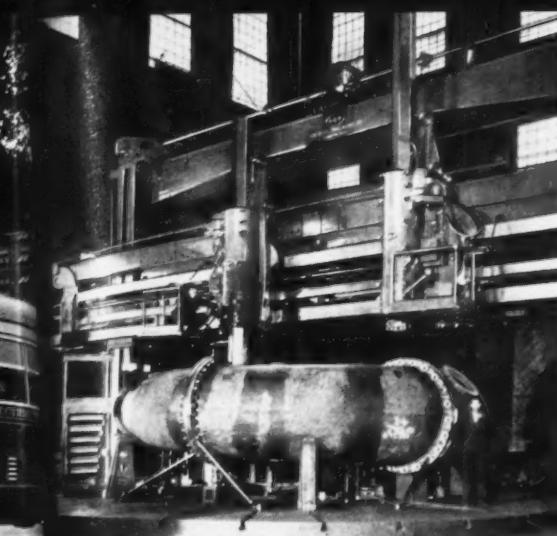
Here the men responsible for results and production in our great machine tool using industries will have an opportunity to study the combined efforts of the entire machine tool building industry. In the six years since the 1929 Machine Tool Show was held, there has been such extraordinary progress in the development of new machine tool designs that the very fundamentals of production methods have changed to a marked degree. Not only have production possibilities changed, but with them, the production manager's responsibilities. Every manufacturing executive who recog-

nizes that this is a time of progress and change will be in Cleveland to see and to learn what the machine tool industry has made available for him—for the maintenance of the effectiveness of his plant, for the continued advance of American mechanical practice.

An unequalled opportunity is provided by this Exposition for obtaining information and new ideas; and from this concentration point of mechanical practice, ideas will be carried back to plants far and near, in this country and abroad, which will enable those responsible for the mechanical progress in the great machinery industries to produce more easily, more efficiently, more accurately, and at less cost.

This, in turn, will broaden markets through the increasing use of products for which there will be a greater demand at a lower price; and as this places greater pressure on manufacturing facilities, it will steadily provide more employment and





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## CIVILIZATION ITSELF, STANDS THE MACHINE TOOL

increase wages. Thus the standard of living will be raised another notch. And back of all this is the machine tool.

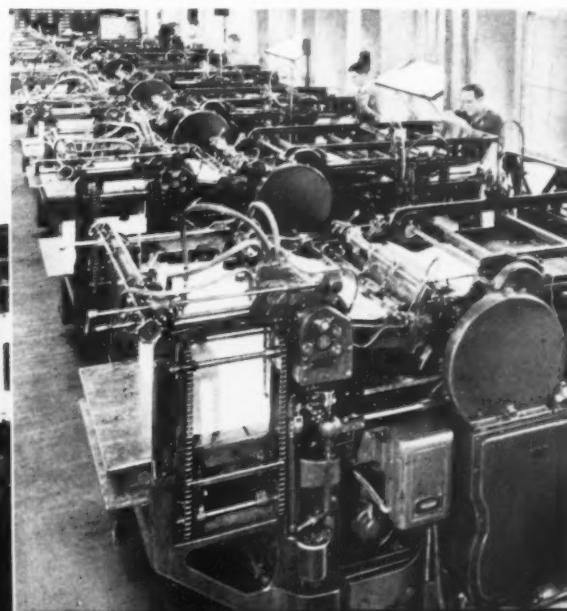
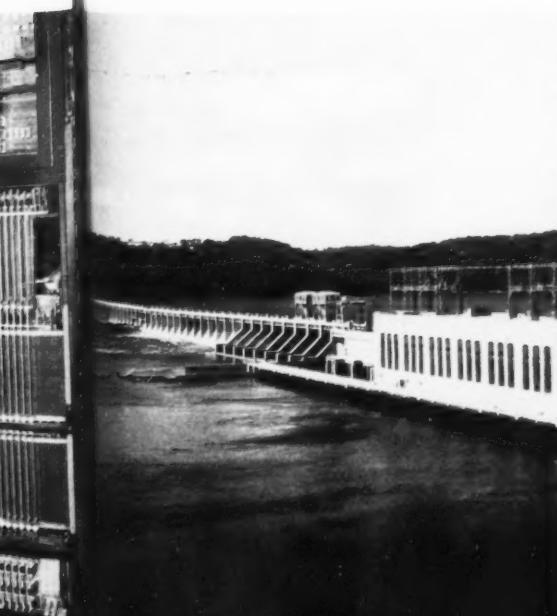
Because, significant as this Exposition is as an indication of mechanical progress, it is still more significant as a concrete demonstration of what the machine tool means to the nation—to the world—as a whole. Back of all engineering progress, back of the advance of civilization itself, stands the machine tool—the master tool of industry.

It is mechanical power and industrial machinery that make our civilization and culture possible. The textile machinery that turns out delicate fabrics; the woodworking machinery that produces our furniture; the machines and implements that ease the farmers' work, and the equipment of the thousands of plants engaged in the manufacture of food products; the ships, engines, and cars that haul these products to the market; the millions of automobiles; the huge electrical machines that

make possible the lighting of our streets and homes and that provide the power for the one hundred and one different electrical appliances in the household, office, and factory—everything that makes modern life comfortable and convenient to a degree that would have sounded like a page out of a fairy tale fifty years ago—all this equipment is produced by the use of machine tools.

Hence of all industries, the machine tool industry is truly the basic one; of all essential industries, it is the most essential; to all the key industries, it is the master key.

And yet, that industry's importance does not end there. It is not only our material progress—our comfort and convenience—that has been made possible by the master tools of industry. They have also played a part, the importance of which can only be estimated, in the cultural achievements of our age; for back of the universal distribution of knowledge, of cultural endeavors, we find again the



machine tool. Paper-making on a large scale, printing presses, books and newspapers, the radio, the communication of messages in an instant throughout the world—all this is made possible by the machines that build machines.

And so the Machine Tool Exposition in Cleveland has a significance far beyond the mere industrial service that it renders; yet it is with this industrial service that *MACHINERY*'s readers are primarily concerned. To provide a permanent record of the new developments to be shown at Cleveland for the first time, *MACHINERY* is devoting a special section in this number to the new equipment to be seen at the Show. This section will prove a means of reference for months to come. It will also provide an opportunity for those mechanical executives and engineers who may be unable to go to Cleveland, to learn of the new equipment to be seen there. It will bring the Exposition to them.

Industrial progress is not made by machines alone; it is made by men, and it seems fitting at the time of this epoch-making Show to pay a tribute to some of the engineers who have been instrumental in designing the new machines and to some of the manufacturing executives who are responsible for mechanical progress in the great machinery industries in this country and abroad. Throughout this number, therefore, will be found the portraits of a large number of prominent manufacturing executives and

engineers. Their number is by no means complete—a complete picture gallery would require hundreds of pages—but they are representative of the great body of men who occupy what may be termed the key positions in the world's mechanical industries.

In connection with the Machine Tool Show, there will be held in Cleveland a Machine Tool Congress, in which will participate, in addition to the National Machine Tool Builders' Association and the visitors to the Exposition, the American Society of Mechanical Engineers, the Society of Automotive Engineers, and the American Society of Tool Engineers. These Societies will hold meetings during the Exposition; papers pertaining to the progress in the machinery industries will be read and discussed. The American Society of Mechanical Engineers will hold two evening sessions, Wednesday,

September 11, and Thursday, September 12; the Society of Automotive Engineers will meet on the evenings of Wednesday, September 18, and Thursday, September 19; and the American Society of Tool Engineers on Friday, September 13. All the meetings will be held at the Hotel Statler, which is also the headquarters for the Machine Tool Congress.

The Cleveland Exposition Hall and Public Auditorium, where the Exposition itself is held, is centrally located. It will be open daily, except Sunday, from 9 in the morning until 6 at night.



# To the Men Responsible for Continued Progress in the Mechanical Industry

By RALPH E. FLANDERS

President, American Society of Mechanical Engineers and President, Jones & Lamson Machine Co.



IT is peculiarly fitting at this time that tribute should be paid, in the following pages of portraits, to the men now living who are responsible for the high state of perfection reached by our production machines and processes and by the industrial organizations of which they are a part.

The beginnings of our machine industry have had their proper share of attention. The names of Arkwright, Watt, Maudsley, and Naysmith in England are held in high honor; and we have not entirely neglected the memories of Howe, Whitney, Brown, Sellers, and others of the band of American pioneers. Yet we are prone to consider our duty done when we recognize the services of these early engineers, forgetting that their work would have had little significance if it had been left at the point where they laid it down. The fact is that these men would have remained in obscurity, essential and magnificent though their contributions were, had their researches and discoveries not been carried on, improved, and widely extended by the brilliant engineers, inventors, and industrial leaders who succeeded them.

This work of development and extension has proceeded at an increasing tempo from one generation to the next; and it is at this moment in hands as capable as have ever been applied to the task in any preceding period. It is, therefore, fitting that an attempt should be made to give recognition to these men of our time who are carrying on the long process of industrial progress, and thereby laying the firm foundations for the continued social progress which may be built thereon.

These men are to be found in all civilized countries, in all mechanized industries. Their numbers are too great to permit all to be mentioned and honored. The accompanying gallery of portraits can, therefore, be representa-

tive only. The faces of many men of equal rank with those shown are of necessity omitted. Yet the list, though regrettably incomplete, is truly representative.

They are all users of machine tools—the machines that make machines—the master tools of industry. Some of them are, in addition, designers and builders of machine tools, and are personally responsible for the rapid progress of the last decade. But no one of them would call himself solely responsible even for his own contribution. The user has also played his part in the new developments.

There is no branch of the machine industry that bears quite the intimate relation to mechanical progress in general that the machine tool industry does. Without the machine tool, the whole fabric of modern society would dissolve and vanish.

Based on the continued use and improvement of the machine tool, the men whose features are here shown, and hundreds of others whose portraits would have been included if they could have been obtained, will continue their work of producing more and more of the good things of life at less and less cost, thereby raising the general standard of living and ministering to the material well-being of mankind.

These men have done their part ably. If there has been in the past recurrent difficulty in making these blessings available to the mass of the people, the fault does not lie with them. If we are to have in the future a higher standard of living—one more equitably distributed and less subject to severe fluctuations—these benefits can come only from the continued and intensified work of these same men, their unportrayed associates, and their successors.

# *Machine Tool Builders' Association Extends Welcome to Exposition*

By CHARLES J. STILWELL

*President of the Association*



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**Charles J. Stilwell, President,  
National Machine Tool Builders'  
Association and Vice-President,  
Warner & Swasey Co.**

**W**ELCOME, Industrial America! The Machine Tool Builders of the United States extend their hand in friendly greeting to you—executives, engineers, and financiers—all who have a stake in industry.

Machine tools representing a six-year evolution in mechanical invention await you in Cleveland at the National Machine Tool Show, September 11 to 21—the largest industrial exposition ever held on this continent.

The builders of these master tools of industry have blazed new trails along the frontiers of engineering. All their paths lead toward expanding markets, where improved products will sell at lower costs in steadily growing volume. They present to you at Cleveland the tools of today, designed for the products of tomorrow.

In the three-million-dollar machine shop that has been equipped in Cleveland's new Exhibition Hall, the world's ablest mechanical executives will find answers to their thousands of manufacturing problems.

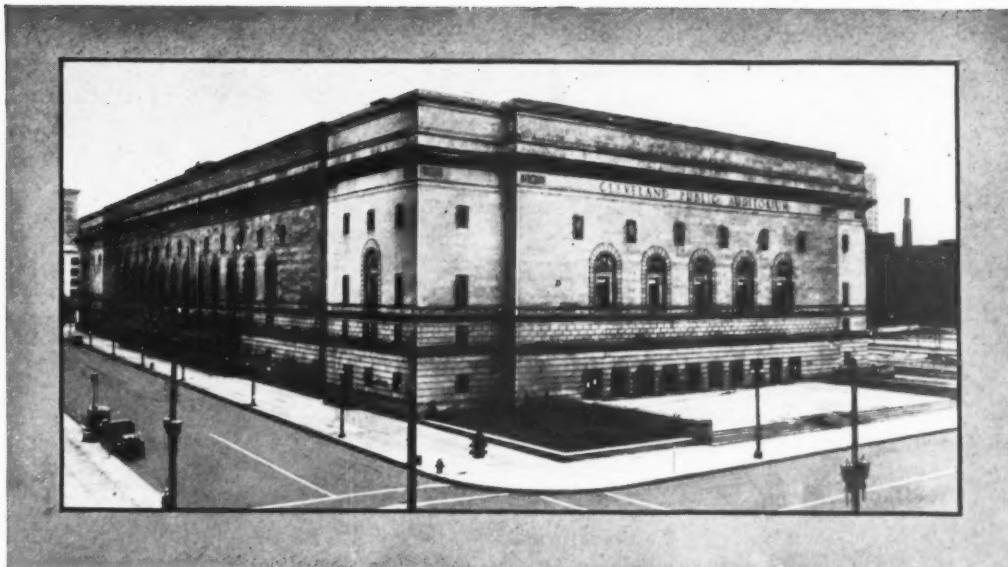
New machines with astounding capacities for reducing costs will suggest unsuspected ways and means of meeting the competition of rival manufacturers.

We welcome the whole industrial world to Cleveland. Here—for the first time since 1929—management has a real opportunity to catch up with the onward march of mechanized industry.

We invite you to discuss production problems with the technical experts and exhibitors who will be ready to give their thought and attention to particular needs of individual machine tool users. We invite you to enlist their services for special studies, which they are well equipped to make in the light of their broad knowledge of varying conditions in many plants.

Together, machine tool users and machine tool builders will find the way toward advanced, accurate, and efficient operations which can be attained only by the right kind of equipment, properly installed, and correctly used.

We welcome you to Cleveland. We invite you to register at the National Machine Tool Show where the Key to Industrial Progress will be placed in your hand and where a Passport to Profits awaits you.



## *New Shop Equipment To Be Seen at the Show*

*This Section Includes Only  
Machines and Tools that Have  
Not Been Previously Described*

**I**N the following pages are described and illustrated a large number of the new and improved machines that await the visitor at the Cleveland Show. These machines are representative of the present trends in machine tool design, and show the great progress that has been made in the last six years, since the last show was held.

In these brief introductory paragraphs it is not intended to review these trends in detail, but it may not be out of place to call attention to certain definite tendencies in design. The visitor to the Show will be impressed particularly by the greater power of present-day machines; the heavier and more compact design; the greater speed range to meet the production possibilities of the new cutting-tool materials; the adaptation of standard machine tools to special operations, and the ease with which these machines can be changed from one specialized operation to another; the widening field of the completely automatic type of machine for both large and small quantities of work; the simplification in the control and operating facilities; and the constantly increasing use of hydraulic and electric means for such control.

The changes and improvements in what are generally known as standard machine tools are espe-

cially striking. A few years ago it was thought that the standard types of machines had been developed practically to their ultimate form and design. How far from the facts this was is well evidenced by the new machines—still standard—but of a design, capacity, and application so far ahead of the older types as to suggest an entirely new era in machine tool design.

In the more specialized machinery fields we find even more radical departures. Among these should be mentioned broaching machines, honing machines, precision boring machines, and the unit construction of drilling, tapping, boring, and milling heads that may be applied to build up entire machines for special operations. The new machines for external or surface broaching are receiving an increasing amount of recognition.

While the influence of the new cutting materials is evident in the design of many types of machine tools, progress equally great has been made in machines where metal tools are not used, such as grinding and honing machines. The efficiency of these types of machines has, however, been enhanced by new developments in grinding wheels and abrasives. There has been progress all along the line.

## New Designs of Norton Grinding and Lapping Machines to be Exhibited

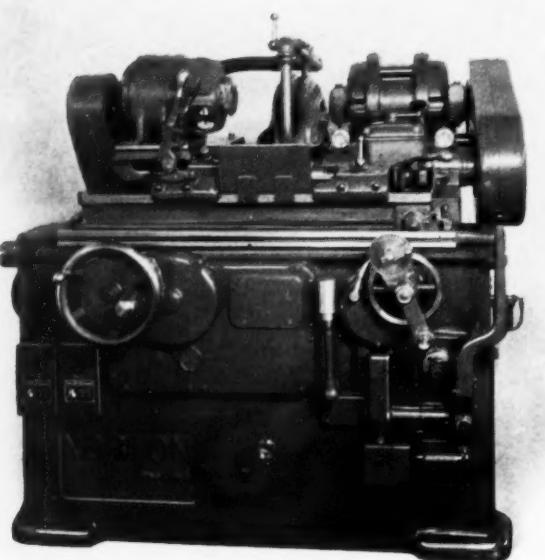


Fig. 1. A 6-inch Plunge-cut Grinding Machine Hydraulically Actuated will be One of the New Machines in the Norton Exhibit



Fig. 2. A Tool-room Surface Grinder with a Larger Wheel-spindle than Ordinarily Used, Driven by a Hevaloid Belt

THE Norton Co., Worcester, Mass., will exhibit ten grinding and lapping machines, including the hydraulically operated 6-inch plunge-cut machine shown in Fig. 1; the 6- by 18-inch tool-room surface grinder, Fig. 2; a new universal lapping machine, Fig. 3; and two universal tool and cutter grinders, Figs. 4 and 5.

In addition, there will be exhibited for the automotive industry, a new crankpin grinder, known as D-86, and an improved cam contour grinder, known as the Cam-O-Matic. There will be two new 6-inch machines in the Type C class, a 6- by 18-inch semi-automatic and a 6- by 30-inch hydraulic traverse machine with hydraulically operated continuous power cross-feed. There will also be a hydraulically operated, high-production lapping machine known as the Hyprolap.

The hydraulically operated 6-inch plunge-cut machine, Fig. 1, can be built either as a semi-automatic or as a traverse machine, or with both features. It is possible to convert one to the other after the machine has been installed in the customer's plant, if desired. This type is available in 18- and 30-inch lengths, the 18-inch size being shown at Cleveland. The semi-automatic type re-

quires the operator simply to unload, load, and move a lever, starting the automatic cycle.

The 6- by 18-inch surface grinder,

Fig. 2, is especially intended for tool-room work. This machine is provided with a much larger wheel-spindle than ordinarily used, driven by an imported flat belt known as the Hevaloid. One of the operations to be demonstrated will be the grinding of tungsten-carbide tools with Norton diamond wheels.

The hydraulically operated machine known as the Hyprolap, shown later in these pages, is designed for the high-production lapping of flat work up to 6 inches across its longest dimension or for cylindrical work up to 6 inches in length. Twenty-four inch diameter bonded abrasive laps are used, both of which rotate, but in opposite directions and at different speeds. The work is caused to travel in a circular path between the laps. Two hydraulic cylinders, one on each side of the upper lap spindle, raise and lower the upper lap and also provide pressure on the work during lapping. The upper lap spindle is counterweighted, so that the pressure applied hydraulically is actually the pressure on the work.

One of the principal features of the No. 2 universal tool and cutter grinder, Fig. 4, is the hydraulic table traverse mechanism for both cylin-



Fig. 3. Lapping Machine for Small Piston Pins, etc.

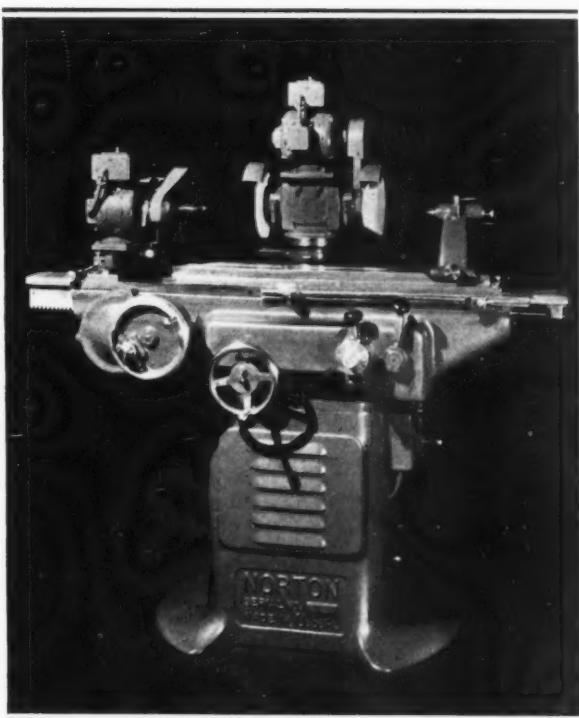


Fig. 4. Universal Tool and Cutter Grinder with a Hydraulic Table Traverse



Fig. 5. Universal Tool and Cutter Grinder that can be Operated from Front or Rear

drical and internal grinding, and, in some cases, for the grinding of cutters. The wheel-spindle is driven by a V-belt from a motor mounted directly above the wheel-head on a post that carries the spindle and that can be raised and lowered by means of a graduated elevating handwheel.

When the machine is to be used entirely for cutter grinding, it can be equipped with a left-hand footstock which, with the regular footstock, provides for the grinding of cutters mounted on centers.

A graduated handwheel in front, as well as one at the rear of the machine, permits operating the saddle from both front and rear. Likewise, a handwheel at the front permits moving the table by hand.

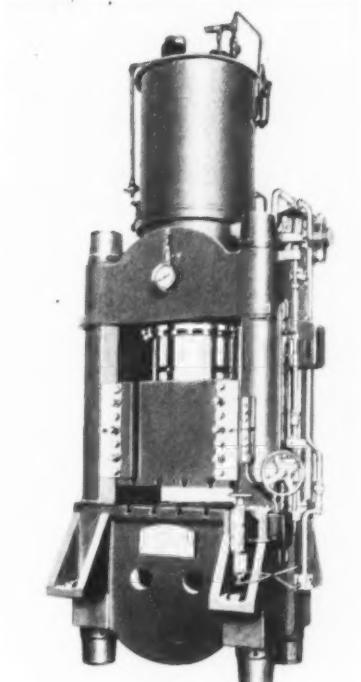
The No. 1 universal tool and cutter grinder, Fig. 5, has a large, heavy, box-casting base and long saddle ways of the dovetail type. It can be operated from either the front or the rear, the cross-feed being provided with a handwheel at both points, graduated in thousandths of an inch. Furthermore, the table can be operated by a feed-screw from a handwheel at the end, also graduated in thousandths of an inch, which can be transferred from one end to the other. Likewise, a table-operating lever and a handwheel at the front of the machine are provided for traversing the table. This lever and handwheel can be used at either side.—Booth No. 101

A REPRESENTATIVE type of a line of presses known as the H-P-M Hydro-Power Fastraverse presses, intended for production service, will be exhibited by the Hydraulic Press Mfg. Co., Mount

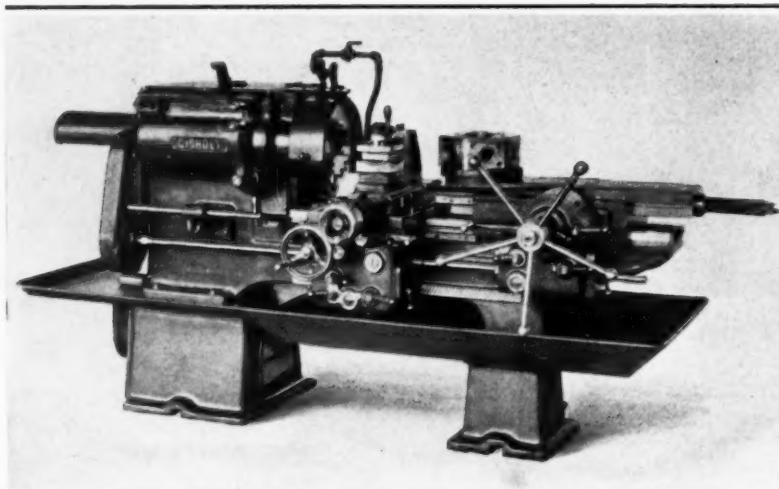
Gilead, Ohio. These presses embody several improvements on the original automatic high-speed hydraulic press introduced by the company at the first Machine Tool Show in 1927.

The Hydro-Power press is self-contained, with direct electric motor drive. The hydraulic circuit provides for direct pressure connections between the source of pressure and the press cylinders without intervening valves. The travel control provides means for controlling the press either automatically, semi-automatically, or manually.

Automatic operation is accomplished by the aid of a patented hydro-electric control. This includes push-button starting, automatic pressure reversal, and instantaneous emergency reversal. When set for semi-automatic operation, the press ram stops at the initial position at the end of each cycle. The full-automatic press repeats the cycle, restarting each time automatically. Change from one mode of operation to the other is effected by the turn of an electric switch. Manual control provides accurate regulation of both speed and direction of ram movement. This is especially used for die set-ups and testing. Two types of frames are used, the open-rod type and the closed upright, shrunk-rod type.—Booth No. 1014



Hydro-Power Press Designed for Production Service



*Turret Lathe Designed for Instant Shifting to Speeds Suitable for Drilling, Tapping, Boring, Turning, or Threading*

### *Gisholt No. 3 Turret Lathe Designed for Fast Manipulation*

FAST manipulation on light work, yet sufficient power and rigidity for taking heavy cuts on work within its capacity, are features of a new No. 3 turret lathe which will be exhibited by the Gisholt Machine Co., 1209 E. Washington Ave., Madison, Wis. This machine will be built in both plain and universal models.

The bar stock capacity is 1 1/2 inches in diameter by 10 inches long. For chucking work, the swing is 9 5/8 inches over the cross-slide or 18 1/2 inches over the ways. Six spindle speeds and reverse can be obtained in the normal speed range of 65 to 730 revolutions per minute. A higher or lower speed range can be had to meet specific needs. The six speeds are in groups of three high and three low speeds. A multiple-disk clutch between these two groups permits shifting instantly from one group to the other without stopping the spindle; thus shifting from a drilling to a tapping speed, from a boring to a reaming speed, or from a turning to a threading speed is accomplished without loss of time.

A single control lever stops and reverses the spindle through powerful multiple-disk clutches, a spindle brake being automatically applied when the control lever is in the neutral position. Accidental starting of the spindle is prevented by a safety latch. The drive from the spindle to the chuck or work-holding member is through a steel key which eliminates the tendency of chucks and fixtures to tighten on the spindle and also prevents them from spinning off when the spindle is stopped suddenly.

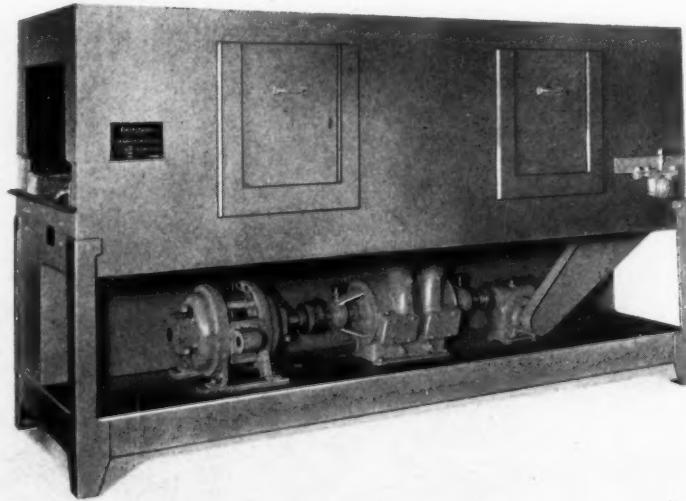
The square-turret toolpost can be unclamped, indexed, and clamped by means of one handle.

The hardened steel ways attached to the bed are ground in place to obtain accurate alignment with the tapered bores of the spindle bearing caps. In the universal model, the cross-slide has eight power feeds, both crosswise and longitudinally, with reverse for both feeds. These feeds are independent of the turret feeds. Pressure lubrication of the cross-slide ways, turret apron, and bed ways is provided by hand pumps.—Booth No. 112

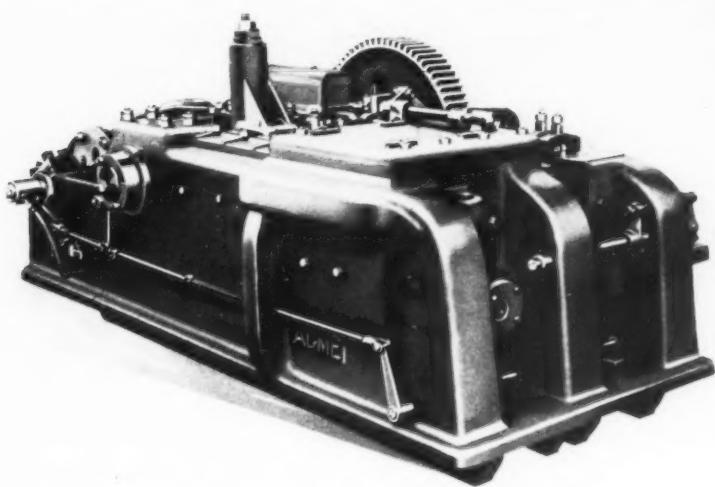
### *Colt Autosan Cleaning and Drying Equipment*

TWO machines designed to wash and dry parts in process will be in operation at the booth of the Colt's Patent Fire Arms Mfg. Co., Hartford, Conn. One machine, known as the Model MR-8, is a standard washing and rinsing unit, designed to clean a wide variety of parts thoroughly. The parts are placed on a wire-mesh conveyor and automatically carried through the powerful washing and rinsing sprays. This machine is equipped with two outside or extended tanks on the side opposite that shown in the illustration. Each tank has perforated scrap trays which are easily removed for emptying. Twelve tubes are provided, three above and three below in both the wash chamber and the rinse chamber. All tubes are easily removed for cleaning without the use of tools. Several types of conveyors can be furnished to suit the type of work.

The other machine to be exhibited is the Model 270 revolving type dryer. In this unit, which is being used in many large industrial plants, the parts are carried through the chamber by means of a revolving drum with an internal fixed spiral, and are continuously subjected to blasts of circulating hot air. This unit can be used in connection with the washing unit to provide for the continuous handling of work or it can be employed as a separate dryer.—Booth No. E-210



*Colt Autosan Equipment Designed for Washing and Drying a Wide Variety of Parts*



*Acme Forging Machine with a Friction Cushioned Drive and a New Patented Header-slide Movement*

### *Acme Cushioned-Drive Forging Machine*

THE Acme Machinery Co., 4533 St. Clair Ave., N.E., Cleveland, Ohio, will exhibit a machine embodying two main features—the company's friction cushioned drive, for which is claimed not only the production of better forgings, but also lower machine maintenance cost; and a new patented movement for operating the header slide.

Briefly, the object of the design of the sliding head movement is to obtain the following advantages: (1) Increased power. (2) Elimination of the pitman movement with the small bearing area on the pitman pin, and the substitution of the large area possible with the sliding head and the resultant lower pressure per square inch. (3) Elimination of any tendency for the front end of the header slide to rise when the heading tools are placed above the center line of the shaft; and elimination of a tendency for the rear end to rise when the tools are located below the center line of the shaft. This assures accurate alignment of the heading tools throughout the entire stroke cycle. (4) The taking up of all play on the large flat sliding head surfaces, as well as wear in the large circular eccentric bearing, by the provision of an adjustable taper gib.

It is stated that with the same power input at the center of the shaft, the new sliding head movement delivers from 15 to 20 per cent more power to the header slide than formerly.

Among other features of these machines may be mentioned: The clutch

and brake on the smaller machines (2 inches and under) are mechanically operated by means of a cam; on the larger machines (2 1/2 inches and upward), the clutch and brake are air controlled through a single piston.

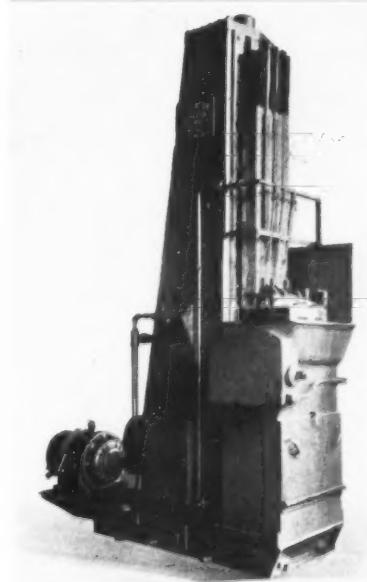
The main shaft is of the eccentric type, permitting a large bearing area in the sliding head, with lower pressures per square inch and low maintenance expense. This construction practically eliminates crankshaft deflection under heavy stresses.—Booth No. 311

### *American Vertical Surface Broaching Machines*

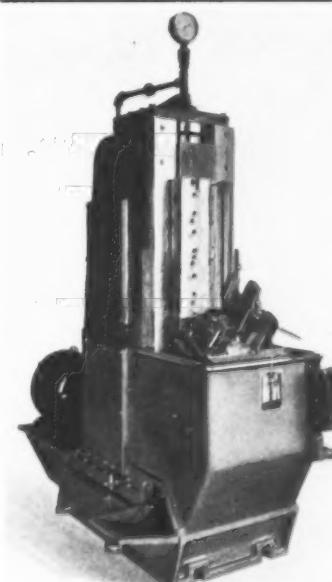
TWO sizes of vertical surface broaching machines have been added to the line made by the American Broach & Machine Co., Ann Arbor, Mich.—a 52-inch stroke and an 18-inch stroke machine.

The 52-inch stroke machine is equipped with a variable-speed control providing a maximum speed of 30 feet per minute of the cutting tool. The machine is of 35-ton capacity. As shown, the machine is provided with a tilting fixture operated by means of a push-button. In starting an operation, after loading the fixture, the operator pushes the button, which causes the fixture to rock into the broaching position. The broaches then move downward, and immediately upon finishing the cut, the fixture opens up, permitting the operator to unload and load during the upward return stroke of the tools. The broach-holder is arranged to hold three sets of broaches. The cycle time is thirty seconds; hence six pieces are finished a minute.

Fig. 2 shows the smaller vertical surface broaching machine, having an 18-inch stroke and 4-ton capacity. This machine is also shown toolled up with an automatic tilting fixture arranged for broaching several parts at the same time. Like the other machine, it is provided with a variable-speed control, giving a maximum speed of 35 feet per minute.—Booth No. 1005



*Fig. 1. American Broaching Machine with a Stroke of 52 Inches*



*Fig. 2. Surface Broaching Machine for Work Requiring a Short Stroke*

## Gould & Eberhardt Universal Hobbing Machine of Unusually Large Size

A GEAR-HOBING machine especially intended for the accurate and rapid production of spur gears, single and double helical gears, and worm-gears has been brought out by Gould & Eberhardt, Newark, N. J. This machine, known as the 72-H, has a capacity for gears up to 48 inches in diameter within the support, and 80 inches with the support removed. The face capacity for spur gears is 20 inches; the pitch capacity, 1 1/2 diametral pitch in steel. Following the regular practice of the company, the machine is built on the vertical cutting principle, with the hob-slide mounted on an adjustable stanchion and the work-spindle fixed within the base of the machine.

The swivel cutter support has an angular adjustment of 180 degrees for cutting right- and left-hand helical gears. The cutter rotation for both the right- and left-hand gears is controlled mechanically without reversing motor or pulleys. The hob-spindle is of new construction: A bronze tapered sleeve is shrunk on the alloy steel spindle, and rotates within a hardened steel tapered ground bushing.

Independent adjustments are provided to maintain the respective diameter and end-fits of the hob-spindle. Either adjustment can be made without disturbing the setting of the other or dismantling and refitting the spindle unit. A hob-positioning device permits of quickly shifting the hob axially.

Power rapid traverse is provided to move the hob-slide rapidly, and it may be operated with the cutters and work-spindles rotating. Rapid traverse is also available to move the stanchion in either direction. A differential mechanism for cutting helical gears is built directly into the machine. This differential can be entirely disconnected when cutting spur and worm gears and when cutting helical gears by the non-differential method.

An automatic in-feed mechanism is incorporated for automatically hobbing single and multiple worm-gears by the in-feed method of cutting. The index worm and gear adjustment is so arranged that the original center distance of the main driving index worm and gear is retained at all times.—Booth E



Honing Machine, Instantly Adaptable for Diameter or Length of Bore

## Hutto Hydraulically Actuated Honing Machine

AN upright, single-spindle, crank reciprocated honing machine, which is known as the V-300 series, with variable-speed mechanical rotation drive, hydraulically controlled, and variable hydro-mechanical reciprocation drive, has been developed by the Hutto Engineering Co., Inc., 515 Lycaste Ave., Detroit, Mich.

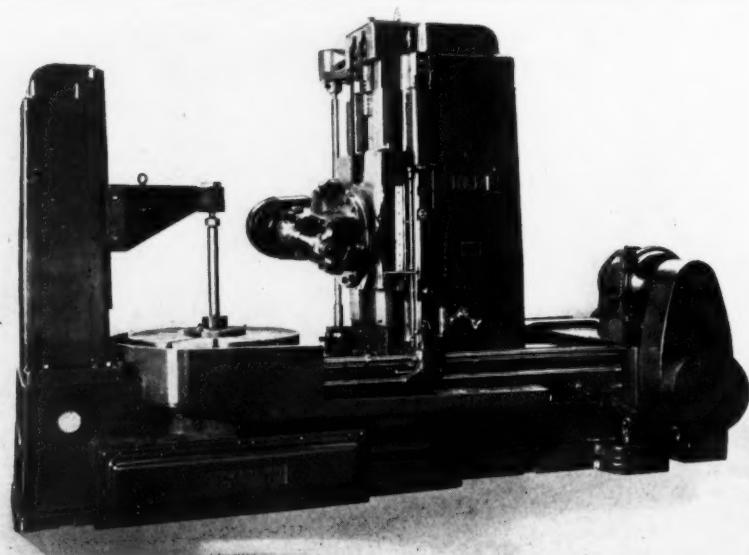
The machine is so arranged as to make it instantly adaptable to any diameter or length of bore within its capacity. The rotation and recip-

rocation speeds are independently adjustable, and any rotation speed within the range of the machine is obtainable by a variable-speed V-belt drive mechanism. The machine is equipped with a mechanical lift-out, hydraulically actuated, for withdrawing the hone from and inserting it into the bore.

The reciprocating mechanism, although hydraulically controlled, is mechanically actuated through a crank type mechanism. Any speed within the range is available through a feed control valve. If desired, adjustments can be provided to permit dwell in the stroke at either or both extremities, as, for example, in honing blind-end bores in aircraft cylinders.

The company will also exhibit a variety of hones. One of the newly developed types is known as Model KKL. In this hone, the segmental members consist of abrasives and fiber parts. The latter act as guides when the hone is withdrawn from the bore and prevent stone markings at the top end of the stroke when the hone is withdrawn. They also equalize the wear on the stones.

A new feature is the separate adjustment of the finishing hones for expanding the fiber guides independently of the stone adjusting mechanism. By turning a knurled sleeve, the fibers are contracted or expanded without affecting the stones.—Booth No. 22-a



Gears up to 80 Inches in Diameter can be Hobbed on the New Gould & Eberhardt Machine

## SOME OF THE ENGINEERS RESPONSIBLE FOR THE NEW DESIGNS AT THE SHOW



B. P. GRAVES, Director of Design,  
Brown & Sharpe Mfg. Company,  
Providence, R. I.



CARROLL KNOWLES, Chief Engineer of the Pratt & Whitney Company, Hartford, Conn.



JOHN E. LOVELY, Chief Engineer,  
Jones & Lamson Machine Company,  
Springfield, Vt.



L. LEE SCHAUER, Chief Engineer,  
Cincinnati Bickford Tool Company,  
Cincinnati, Ohio



R. T. HAZELTON, Treasurer and  
Works Manager, Cincinnati Shaper Co.,  
Cincinnati, Ohio



S. W. MATHIAS, Chief Engineer of  
the Landis Machine Company, Inc.,  
Waynesboro, Pa.



HERMAN OSSWALD, Vice-President  
and Chief Engineer, V & O Press Co.,  
Hudson, N. Y.



JAMES COULTER, Vice-President  
and Chief Engineer of Automatic  
Machine Co., Bridgeport, Conn.

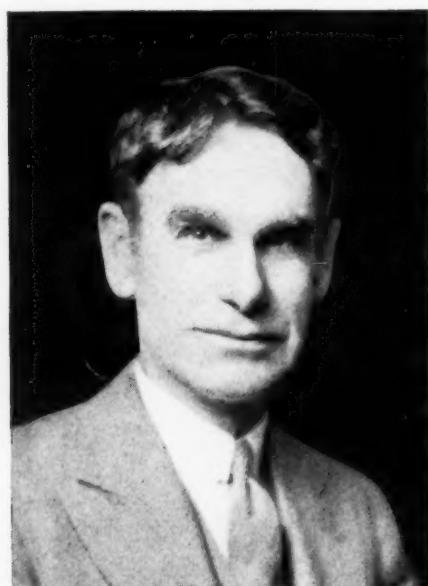


A. E. DRIESSNER, Vice-President and  
Chief Engineer, National Acme Co.,  
Cleveland, Ohio

## SOME OF THE ENGINEERS RESPONSIBLE FOR THE NEW DESIGNS AT THE SHOW



© Bachrach  
FORREST E. CARDULLO, Chief Engineer, G. A. Gray Co., Cincinnati, Ohio



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E. W. MILLER, Chief Engineer of the Fellows Gear Shaper Company, Springfield, Vt.



© Ben Swan  
G. H. ZIMMER, Chief Engineer, Machine Tool Division, Buffalo Forge Co., Buffalo, N. Y.



ALBERT GALLATIN BELDEN, Chief Engineer of Norton Co., Worcester, Mass.



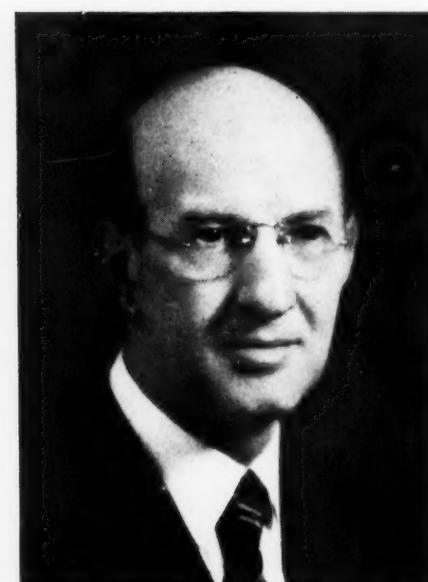
G. D. EVANS, Chief Engineer of the Buhr Machine Tool Co., Ann Arbor, Mich.



A. F. BREITENSTEIN, Chief Engineer, Geometric Tool Co., New Haven, Conn.



RALPH S. DYSON, Special Engineer, Link Belt Company, Dodge Plant, Indianapolis, Ind.



ALBERT M. JOHNSON, Vice-President and Chief Engineer, Barnes Drill Co., Rockford, Ill.



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HOWARD E. TRACY, Chief Engineer of the O. S. Walker Co., Worcester, Mass.

## W. F. & John Barnes Cylinder Block Boring Machine and Hydraulic Units

THE machine shown in Fig. 1 was built by the W. F. & John Barnes Co., 300 S. Water St., Rockford, Ill., for the single-point finish-boring of cylinder blocks. This method eliminates reaming and rough-honing, and produces straight, round holes requiring only a few strokes of the finish hone. The machine and its work-holding fixture are wholly automatic and are operated by the Barnes system of hydraulic units, valves, and controls which are so interlocked that all mechanisms are controlled by one lever.

Briefly, in operation, the control lever is moved to the loading position and two cylinder blocks are drawn into the fixture by a hydraulically operated pull-bar which also unloads the fixture. The handle is next moved to the starting position, which raises the locating pins into engagement with dowel holes, clamps the cylinders, and starts the machine through its automatic cycle. The slides, carrying four boring units each, move into the boring position. Owing to the close center distance of the bores, the units are so arranged as to bore alternate holes in two blocks at each operation.

The boring units are now advanced for boring the cylinders. When this operation is completed, all spindles stop with the boring tool in the proper position. The fixture is then automatically shifted 0.016 inch away from the work, and the spindles are withdrawn to the starting position.

Next the fixture is automatically indexed or moved by hydraulic means the necessary distance for

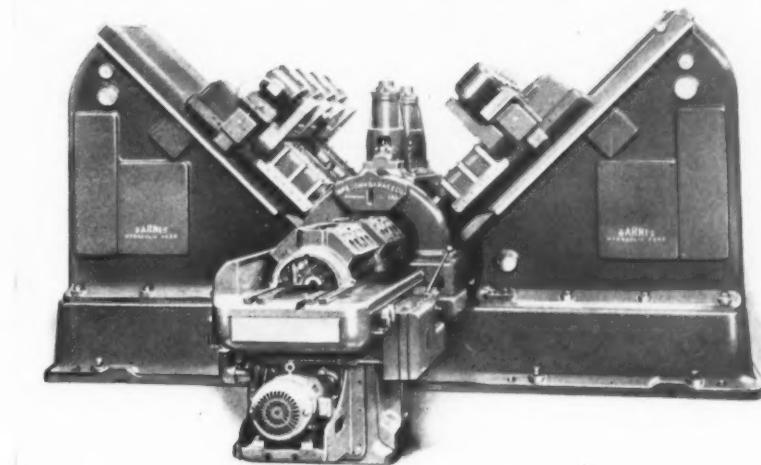


Fig. 1. Barnes Multiple-head Machine which Simultaneously Finishes All Bores in V-eight Cylinder Blocks

boring the next four holes, after which the boring cycle is automatically repeated. Following the second boring operation, the control handle is moved to the unloading position, the locating pins are withdrawn, the blocks unclamped, and the finished blocks pushed out of the fixture.

The boring spindle speed is 520 revolutions per minute with a feed of 0.007 inch. Approximately 0.015 to 0.018 inch of stock is removed. All bores are held to 0.0002 inch tolerance for size. The tool life of the two single-point boring tools is approximately 800 holes per grind.

The Barnes hydraulic feed units to be exhibited will include the flange type unit, Fig. 2, which is adapted

for heavy boring and drilling; an indexing unit for hydraulically indexing the fixture in relation to the boring spindles; a unit used principally for the operation of boring and drilling heads; and a three-horsepower hydraulic, square-ram unit, Fig. 3, designed for a class of work that does not require the heavy-duty hydraulic heads. The latter type can be incorporated in existing machines. Some of the claims made are: Rapid approach of tools to work; easy adjustment to any desired feed rate; accurately controlled dwell; rapid return of tools to starting position; and automatic stopping, or a repetition of the operation.—Booth No. 304-a

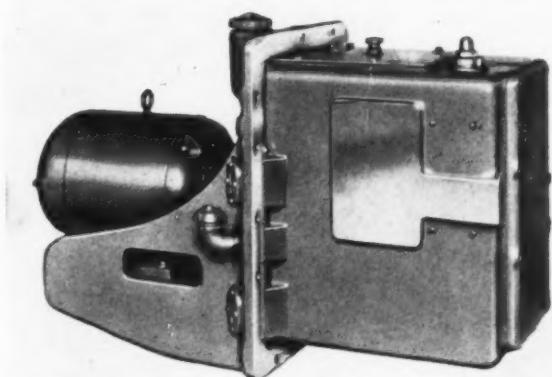


Fig. 2. Barnes Hydraulic Feed Unit Adapted for Heavy Boring and Drilling Operations

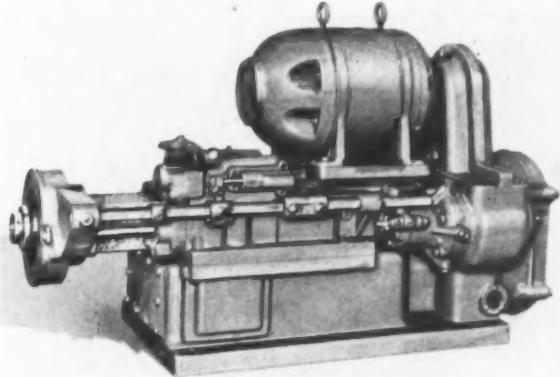


Fig. 3. Square-ram Unit Intended for Operations not Requiring Heavy-duty Hydraulic Heads

**V & O High-Speed Notching Press**

**A** NOTCHING press that will operate at higher speeds and notch more accurately than machines previously developed by the company will be exhibited by the V & O Press Co., Hudson, N. Y. The range of laminations that can be notched on this machine is from 3 to 20 inches in diameter, with a maximum of 120 notches. Equipped with a New Departure variable-speed transmission, it will operate at speeds up to 650 strokes per minute. Either a rotor or stator fixture can be used.

A multiple-disk friction clutch is employed, eliminating shocks from engagement at high speeds, as well as backlash. The fully releasable brake is engaged only when the clutch is released. The thoroughly balanced web type flywheel is specially lubricated for high-speed operation. The journal bearings are of overhanging construction, carrying the thrust directly into the frame proper.

The disks are carried on a friction-driven positive-locking indexing mechanism, adjustable for various diameters of laminations by means of a lead-screw with micrometer dial. The index rings are of large diameter, assuring accurate spacing. The index pawl design is worked out with a view to insuring long life of the index ring and accurate spacing of the disk notches.

A double-length slide runs in ways

of equal length, cut in the solid body casting. Adjustment is made by a single loose gib and one set of adjusting screws. These features se-

cure precision of slide travel and accuracy of punch and die registration. The punch and die employed for the notching operation can be made of simple construction. — Booth No. E-315

**Fosdick Radial, Sensitive, and Upright Drilling Machines**

**F**OUR new machines will be exhibited by the Fosdick Machine Tool Co., Cincinnati, Ohio: a 5-foot, 17-inch column radial drilling machine; a 25-inch upright drilling machine; and two sensitive drilling machines—a No. 4, 16-inch and a No. 5, 24-inch machine.

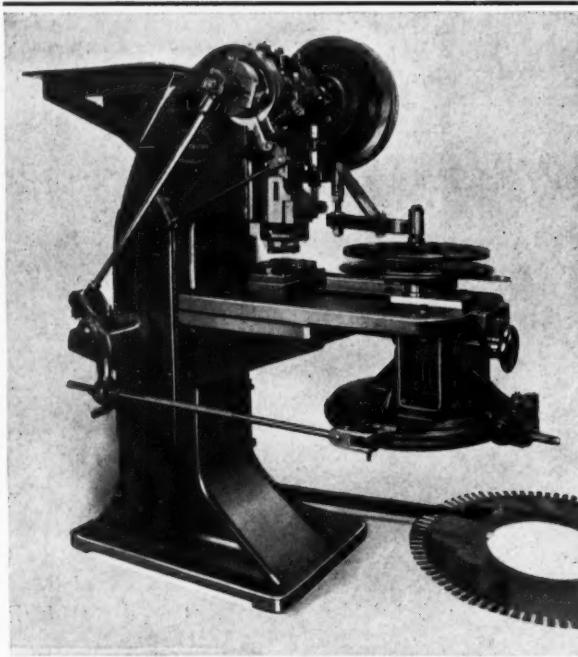
The characteristic feature of the radial drilling machine, shown in Fig. 1, is the hydraulic control for traverse of the head and arm. The head has thirty-six speed changes obtained through sliding gears, and eighteen feeds ranging from 0.003 to 0.125 inch per revolution.

On the right-hand side of the head is a rapid traverse lever, self-indicating for direction, which hydraulically traverses the head at any speed up to 15 feet per minute. The operator has full finger-tip control over this movement and can cause the head to move at a high speed or to merely creep. The handle that controls the hydraulic clamping or unclamping of the column is located on the same side of the head.

On the left-hand side of the head is the lever that clamps the head to the arm—a mechanical self-locking arrangement. On this side of the head also is the arm-raising and lowering handle, which is self-indicating for direction, and controls the hydraulically operated clutch. It also controls the hydraulic clamping of the arm to the column sleeve.

The No. 4, 16-inch sensitive drilling machine, driven by a direct-coupled motor, is equipped with a sensitive tapping control. The motor has two speeds which, with a three-speed gear-box, provides six speeds ranging from 225 to 1800 revolutions per minute. The tapping attachment is of the reversing motor type, controlled by the motion of the rack-nipple hand-lever. When the spindle is brought down, it runs right-hand, and when it is returned, the spindle reverses.

The No. 5 sensitive drilling machine is of a type similar to the No. 4 machine, with the exception that it



Up to 650 Strokes can be Made per Minute by the New V & O Notching Press

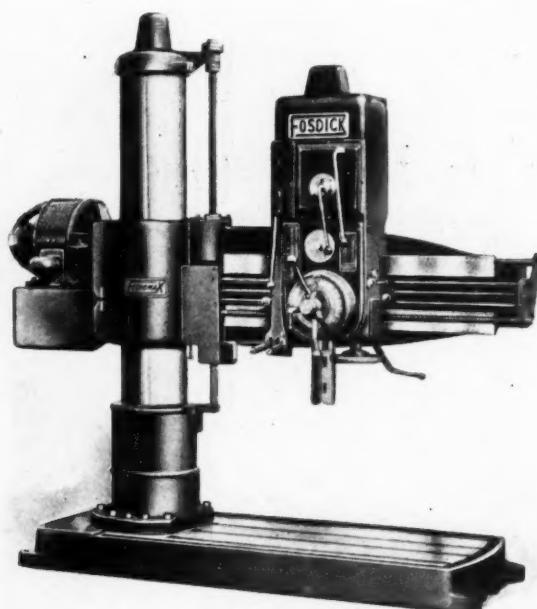


Fig. 1. Fosdick Radial Drilling Machine with Hydraulic Control for the Head and Arm

has a power feed instead of a tapping attachment. It has also a depth stop which disengages the power feed.

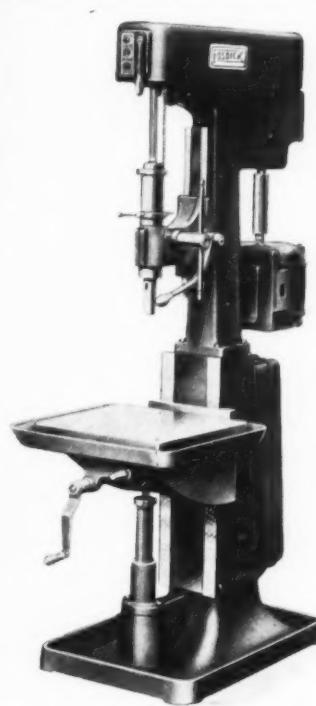


Fig. 2. Sensitive Drill with Power Feed or Tapping Control

Fig. 2 shows a hand-feed machine.

The upright drilling machine, also to be exhibited, has a compound table equipped with an indicator and gaging means for accurately positioning work for boring. This machine has twelve spindle speeds ranging from 60 to 1500 revolutions per minute, and nine feeds from 0.005 to 0.043 inch, with single lever control for both feed and speed changing. It is available in 21-, 25-, and 30-inch sizes, either round or box column type.—Booth No. 1004

**The need for replacement of old equipment by modern machines is obvious to hundreds of potential buyers. From the standpoint of shop economy, they want to buy, and they know that they should buy today.—**

Philip E. Bliss

### Hydram Drilling, Boring and Reaming Machine of Smaller Size

HOLES up to 1 1/4 inches can be drilled in solid SAE 1035 steel by an H-1 model machine which has been added to the line of Hydram drilling, boring, and reaming machines built by the Barnes Drill Co., 814 Chestnut St., Rockford, Ill. Larger machines of this hydraulic-feed self-oiling line were described in the September, 1934, and the September, 1933, numbers of *MACHINERY*.

The illustration shows the new machine equipped with a quick-change speed-box which gives eight selective feeds through two levers. However, the machine can also be furnished with a single-speed box and pick-off gears for any speed.

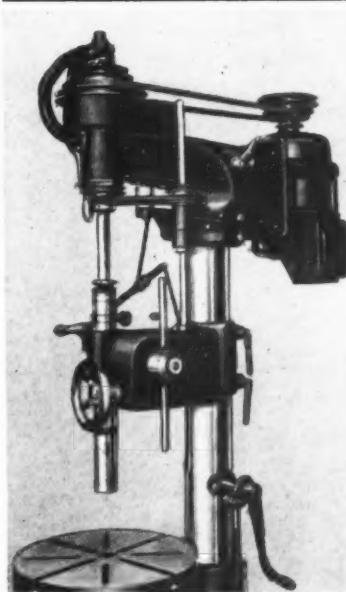
This machine may be supplied in straight-line gangs with a common base and individual tables or with a single long table. Also, several machines of this type may be arranged for progressive production around a hydraulic indexing table of rotary style, which is built by the company.

One of the features of the Hydram line is that the hydraulic pressure is applied directly over the center of the multiple head or the single cutting tool used, and consequently a short saddle only is required on the column. Power is delivered direct from the vertical drive shaft to the short spindle of large diameter through a gear-case carried on the nose of the ram. Unusual stiffness of the ram is obtained by making it



Hydram Drilling, Boring and Reaming Machine of Smaller Size

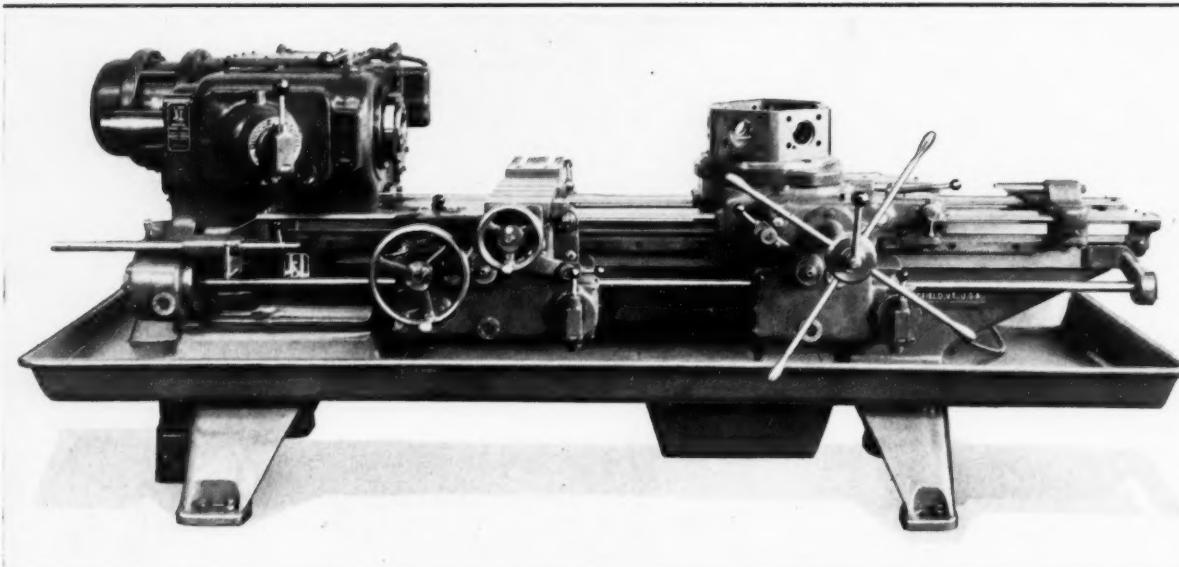
of equal length and of the same diameter above and below the piston. The ram is supported in both upper and lower bearings throughout the entire spindle travel.—Booth No. 201



Buffalo Drilling Machine with Safety Interlock

### Buffalo Forge Upright Drilling Machine

AMONG the machines shown at the booth of the Buffalo Forge Co., Buffalo, N. Y., will be a new No. 22 upright drilling machine. This machine is built for production work and is readily adapted to a variety of jobs. To provide for safety of operation, the back-gears and the direct-drive clutch are interlocked and moved by one lever, which may be shifted while the machine is running idle or at moderate speeds. All adjustments can be made without the use of loose wrenches. Lubrication is arranged for by four pressure-gum fittings. All parts not so lubricated, including gearing, operate in an oil bath or oil spray. A V-belt from the motor drives the spindle as shown.—Booth No. 111



*Single-lever Speed and Feed Selectors with Direct-reading Dials Constitute One of the Features of the New J & L Turret Lathe*

### **Jones & Lamson Saddle Type Turret Lathes with Hardened Ways**

THE exhibit of the Jones & Lamson Machine Co., Springfield, Vt., will include a new saddle type turret lathe built to take 2 1/2-inch bar stock and to be fitted with a 12-inch chuck when used for chuck work. By using standard units, four different machines can be assembled with the same bar and chuck capacity, namely: 2 1/2- by 40-inch saddle type universal turret lathe with fixed center turret (shown in the illustration); 2 1/2- by 40-inch saddle type universal turret lathe with cross-sliding turret; 2 1/2- by 40-inch saddle type fixed center flat turret bar machine, without carriage; and 2 1/2- by 40-inch cross-sliding head flat turret.

All of these machines are provided with these features: Single-lever speed and feed selectors with direct-reading dials. Twelve spindle speeds forward and reverse are obtained through sliding gears. All wiring is built into the headstock, with the control panel located near the operating position. The main spindle is of the flanged type, with taper pilot.

The bed is equipped with hardened ways bolted against aligning shoulders, with vertical and angular bolts spaced 4 inches apart. The ways are covered their full length with stationary, one-piece steel covers. The carriage has a heavy-duty slide for mounting tools in the front and back positions. A spool stop is provided for all longitudinal movements and for the cross-feed.

The apron has a sliding gear transmission, giving nine variable feeds ranging from 0.005 to 0.100 inch on the longitudinal travel and from 0.0025 to 0.050 on the cross-travel. A thread-chasing attachment, as well as a taper-turning attachment, can be installed on this unit.

The saddle also has a sliding gear transmission, giving nine feeds ranging from 0.005 to 0.100 inch, and is equipped with a power traverse giving two speeds in both directions, the

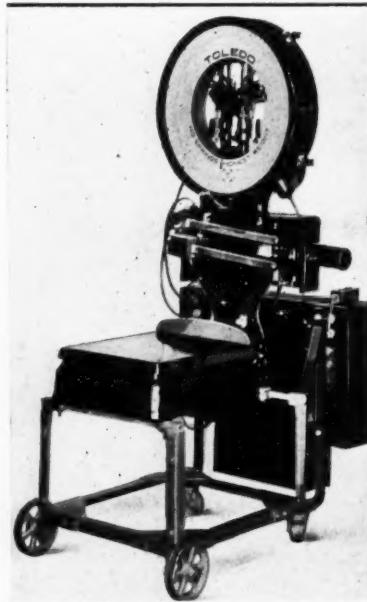
higher speed being used for the longer traversing movements, such as to and from the work, while the lower speed is used for short approach movements to the work and power-indexing of the turret.

Six automatic stops are provided, one for each position of the turret, and three additional manually operated auxiliary stops can be selected for any one position of the turret. All feeds are disengaged by positive stops. Three types of driving units can be supplied—flanged type motor, motor in cabinet leg with V-belt, or a countershaft drive.—Booth No. 607

### **Toledo Scale with Photo-Electric Cut-Off Device**

AMONG the various weighing scales to be exhibited by the Toledo Scale Co., Toledo, Ohio, is a unit consisting of a Toledo bench type dial scale equipped with a double photo-electric cut-off device and an electric automatic taring attachment, arranged for continuous and automatic operation. This equipment is used in conjunction with electric vibrator conveyors for handling metal parts.

It provides a means of automatically taring out or deducting the weight of a container. The photo-electric cut-off device is unique in its application, and is believed to be the only known method of applying a cut-off device to a scale without causing interference with the weighing accuracy.—Booth No. E-309



*Scale with Photo-electric Cut-off Device*

## SOME OF THE ENGINEERS RESPONSIBLE FOR THE NEW DESIGNS AT THE SHOW



PAUL A. MONTANUS, Vice-President  
of the Springfield Machine Tool Co.,  
Springfield, Ohio



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Acme Machinery Company, Cleveland,  
Ohio



RALPH W. YOUNG, Engineer in  
Charge Grinder Division, Charles H.  
Bestly & Co., Chicago, Ill.



G. G. LANDIS, Chief Engineer of  
Lincoln Electric Company, Cleveland,  
Ohio



J. B. ARMITAGE, Chief Engineer of  
the Kearney & Trecker Corporation,  
Milwaukee, Wis.



F. C. BLANCHARD, Vice-President  
and Chief Engineer, Rivett Lathe &  
Grinder Inc., Brighton, Boston, Mass.



J. H. MANSFIELD, Chief Engineer  
of Greenlee Brothers & Company,  
Rockford, Ill.



LEON F. MARSH, Vice-President,  
Universal Boring Machine Company,  
Hudson, Mass.



JOHN C. COTNER, Chief Engineer  
of the Logansport Machine Company,  
Logansport, Ind.

## SOME OF THE ENGINEERS RESPONSIBLE FOR THE NEW DESIGNS AT THE SHOW



*P. S. JACKSON, Assistant Manager in Charge of Engineering, Rockford Machine Tool Co., Rockford, Ill.*



*P. M. HENKES, Chief Engineer of the George Gorton Machine Co., Racine, Wis.*



*D. H. MONTGOMERY, Vice-President, New Britain-Gridley Machine Co., New Britain, Conn.*



*ELTON STILES CORNELL, Chief Engineer, Abrasive Machine Tool Co., East Providence, R. I.*



*CONSTANT BOUILLOU, Chief Engineer in Charge of Design, Hendey Machine Co., Torrington, Conn.*



*L. D. TYSON, Chief Engineer of the Foster Machine Company, Elkhart, Indiana*



*GUNNAR SWAHNBERG, Chief Engineer, Kingsbury Machine Tool Corporation, Keene, N. H.*



*JACOB DEKONING, Designing Engineer, Gallmeyer & Livingston Co., Grand Rapids, Mich.*



*WILLIAM F. ZIMMERMANN, Chief Engineer, Gould & Eberhardt, Newark, New Jersey*

## Bore-Matic Precision Boring Machines for Cylinder Blocks and Pistons

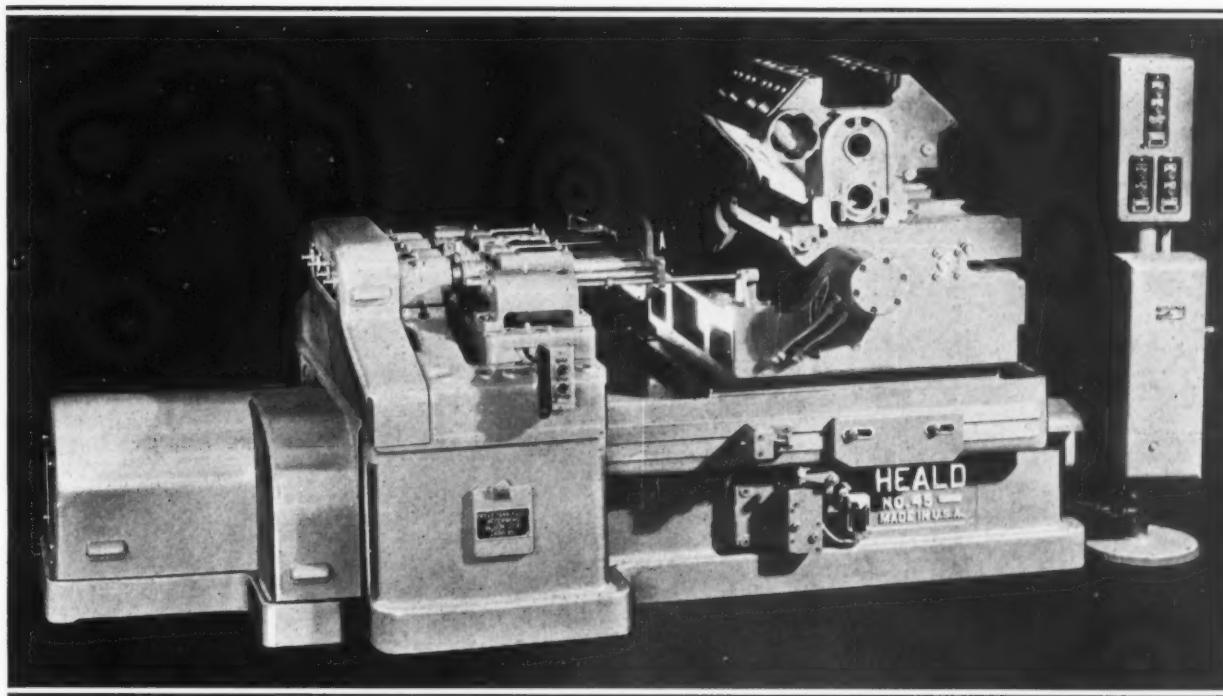


Fig. 1. Bore-Matic Equipped for Finish-boring Eight-cylinder Engine Blocks for High-priced Automobiles

BOOTH compressor and gasoline-engine cylinders will be precision-bored at the Show in a No. 45 Bore-Matic which will be included in the exhibit of the Heald Machine Co., Worcester, Mass. This machine is shown in Fig. 1 arranged for the precision boring of the cylinder bores in V-8 engine blocks for a high-priced automobile. Four bores are machined simultaneously in one side of the block and then the block is reversed in the fixture for finishing the four bores on the opposite side.

This machine has a low table which is reciprocated hydraulically. The bridge for the boring heads is stationary. The table and bridge are made sufficiently wide to permit as many as seven heads to be used for boring or facing operations on work of various kinds.

The control panel of this Bore-Matic is separate from the machine, being mounted on a floor stand as shown. The panel has push-buttons for controlling the starting and stopping of the main drive motor manually, and

for controlling the rapid traverse in-and-out movement of the table independently. The boring and facing feeds are controlled by a screw adjustment on a valve at the front of the base, which is operated by table cams. The lever that operates this valve also operates the switch that starts the boring head motor; another cam and switch stop the motor.

Holes from  $1/4$  inch up to 9 inches

in diameter can be bored in this machine. The maximum length of hole depends upon its diameter, but a stroke of 18 inches can be provided.

Bore-Matics of the type illustrated in Fig. 2 will also be seen at the Show engaged in boring the wristpin holes of automobile pistons and in turning automobile pistons. This No. 49 Bore-Matic is a small double-end machine designed either for per-

forming several operations on individual parts from opposite ends or for "borizing" a number of different pieces that can be handled at one setting. Holes from  $1/4$  inch up to about  $6 \frac{1}{8}$  inches in diameter can be bored with this machine. The total boring stroke for both ends of the machine may be either 11 or  $15 \frac{1}{2}$  inches.

All electric starting and hydraulic controls of this machine are built into the base and guards are neatly fitted over the belts and the dog unit so as to obtain a pleasing appearance. Automatic metered pressure lubrication is provided for the ways.—Booth No. 206

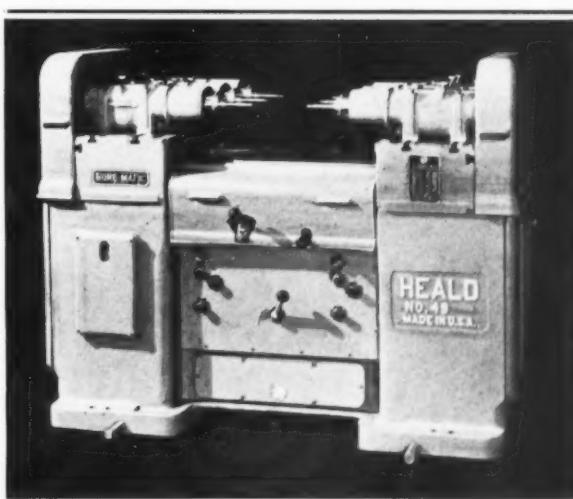


Fig. 2. Light Bore-Matic Arranged for Simultaneous Operations on the Ends of Parts

### Abrasive Machine Tool Co.'s Surface Grinder

A SURFACE grinder which, because of its heavy one-piece, well ribbed bed casting, deep saddle, and heavy spindle, is especially adapted for precision grinding will be exhibited by the Abrasive Machine Tool Co., East Providence, R. I. This machine, known as the No. 3B, has a two-speed gear-box, which provides table speeds of 20 and 40 feet per minute. An oil shock absorber built into the transmission case eliminates the shock of table reversal.

The spindle is fitted to an adjustable phosphor-bronze box at the front and precision ball bearings at the rear. The entire spindle assembly is mounted in a cartridge type sleeve, removable for inspection and repairs. An endless cotton belt drives the spindle, the take-up being taken care of by an idler pulley fixed in position to provide proper belt tension; no belt tightener weight is used. This construction eliminates vibration of the spindle and promotes smooth action.

The feed is automatic, both in the longitudinal and transverse direction, being controlled by adjustable dogs on the table and saddle, as well as by safety dogs. The wheel-slide is provided with one handwheel graduated in one-quarter-thousandths of an inch for fine feed, and one handwheel with a 3 to 1 ratio for quick movements. The transverse-

feed handwheel has a micrometer adjustment and a dial graduated in thousandths of an inch. The table handwheel is provided with an automatic locknut so that it will not re-

volve when the power feed is thrown in, and cannot be engaged.

The work surface of the table is 24 by 8 inches, and the capacity of the machine is 24 inches longitudinally; 8 inches transversely; and 12 inches vertically.—Booth No. 405

### Cincinnati Bickford Three-Foot "Super-Service" Radial Drilling Machine

A THREE-FOOT, high-speed radial drilling machine with a 9-inch diameter column, included in the company's "Super-Service" line and embodying several distinctive features for faster handling and more efficient drilling, is to be exhibited by the Cincinnati Bickford Tool Co., Oakley, Cincinnati, Ohio.

This high-speed radial machine provides spindle speeds as high as 3500 revolutions per minute without the use of belts, all speed changes being made at the head through sliding gears. The spindle speeds—nine in all—are controlled by a single lever. Any one of five speed ranges which may best meet the user's requirements may be provided. An option of two feed ranges is also offered. The feed changes, as well, are made through sliding gears controlled by a simple lever.

The machine has anti-friction bearings throughout; all shafts are

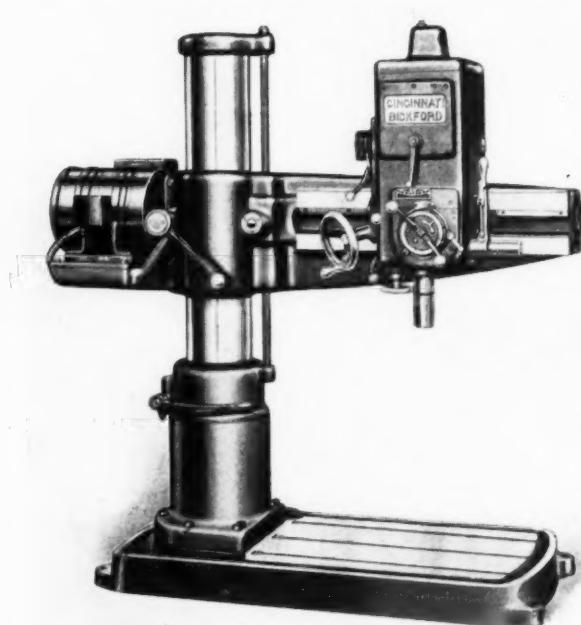
of the multiple integral-key type; and the lubrication is automatic. The head is fully enclosed. The arm may be provided with power elevation controlled by a single fool-proof lever, which also clamps and unclamps the arm. Automatic safety stops are provided.

The feed engagement clutch is of the positive type. The automatic disengagement of the power feed is governed by setting the graduated-dial depth gage. The power feed is automatically disengaged at the top and bottom limits of the spindle travel.

A distinctive feature of the machine lies in the fact that no forward or reverse spindle driving clutches are required; instead, a reversing motor is used. A lever at the lower left of the head operates built-in push-buttons which control forward and reverse rotation and stopping of the spindle.—Booth No. 406



*Abrasive Machine Tool Co.'s Surface Grinder with a Built-in Shock Absorber that Eliminates Shocks from Table Reversal*



*Spindle Speeds up to 3500 R.P.M. are Obtained without Belts on the Cincinnati-Bickford Radial Drilling Machine Exhibited at the Show*



Fig. 1. Ex-Cell-O Machine for Grinding Threads on Screws, Taps, Chasers, and Worms



Fig. 2. Cemented-carbide Tool Grinder of Improved Design

### Ex-Cell-O Thread Grinder and Carbide Tool Grinder

THE Ex-Cell-O Aircraft & Tool Corporation, 1200 Oakman Blvd. Detroit, Mich., will exhibit a new precision thread grinder and also an improved tool grinder for cemented carbide. The precision thread grinder, Fig. 1, has been developed by the company for regular production work in its own plant and has been in use for a number of years. It is a self-contained, motor-driven grinding machine designed for the wet grinding of either right- or left-hand threads on screws, taps, chasers, and worms. Eccentrically relieved taps or chasers can also be ground by the use of suitable indexing fixtures.

Threads can be ground on hardened work from the solid blank with a tolerance in the lead not exceeding 0.0002 inch per inch, or an accumulated error not over 0.0006 inch on longer work. Pitch diameters up to 1 inch in diameter will not vary more than 0.0002 inch, and on larger work a tolerance of 0.0002 inch per inch diameter can be maintained.

The machine will hold work 5 inches in diameter by 18 inches long between centers. Threads up to 5 inches in diameter by 8 inches long can be ground. The wheel-spindle is mounted on a swivel and may be swung in a vertical plane to a maximum of 15 degrees in either direction.

A two-speed motor driving the work-head is provided with a four-step pulley furnishing slow work speeds of 31, 55, 82, and 100 revolutions per minute in one direction and fast work speeds of 62, 111, 165, and 200 revolutions per minute in the opposite direction.

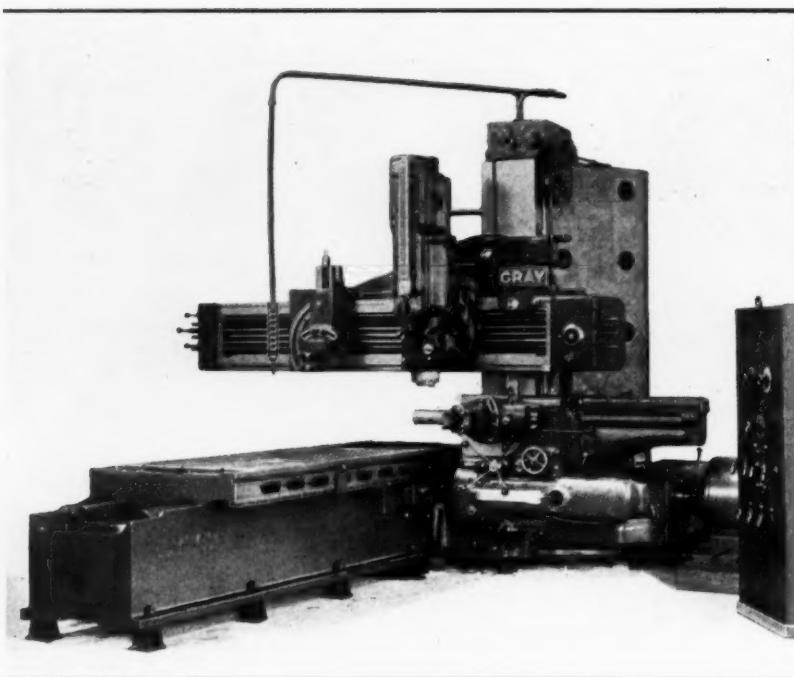
The cemented-carbide tool grinder, Fig. 2, is an improved design of the company's former product. A built-in 3/4-horsepower motor is mounted in the main casting at the top of the machine and drives two diamond wheels. A reversing switch provides the correct rotation of the wheels for right- or left-hand tools. An adjustable tool-support table provides the correct rake on each tool to be sharpened.—Booth No. 812

### Westinghouse Contactor for Built-in Applications



Westinghouse Contactor for Machine Tools Especially

A NEW line of 15- and 25-ampere contactors utilizing the De-ion principle of arc interruption will be displayed by the Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. These contactors are especially applicable to machine tools. Their compactness makes them economical of space and adapts them for built-in applications. A shock-proof vertical-lift solenoid prevents closing, due to tilting, sudden jolts, or bumping. The contactors are self-contained, mounted on a steel base with all parts accessible from the front, and require no additional mounting. For mounting on machines, enclosed cabinets provide adequate wiring space. A new line of 100- and 150-ampere De-ion contactors will also be exhibited.—Booth No. E-304



*Planing, Milling, Boring, and Drilling Can be Performed at One Setting of the Work on this Gray Machine*

### Gray Planing, Milling, Boring, and Drilling Machine

UNUSUAL flexibility and adaptability are provided by a machine that will be exhibited by the G. A. Gray Co., 3611 Woodburn Ave., Cincinnati, Ohio. Planing, milling, boring, and drilling can all be performed on this machine without changing the set-up of the work, thus reducing both set-up and cutting time.

When equipped with an automatic precision setting device that is available for the table and heads, this machine is suitable for machining all types of jigs and fixtures. When equipped with duplex tables, a job can be set up on one table while work is being machined on the second table, or both tables can be used together to support extra long work.

This milling planer is built in both open-side and double-housing types and with any number and combination of milling and planing heads. It requires but a few seconds to convert the machine from a planer to a miller or vice versa.

The milling heads are individual units driven by separate motors, an arrangement which permits of run-

ning the various heads simultaneously at different speeds. These heads are built in sizes ranging from 7 1/2 to 50 horsepower. Milling heads for the rail can be furnished in either swiveling or non-swiveling types. The swiveling heads make it possible to bore, drill, or mill at an angle without tilting the work or using special cutters. Either planing or milling side-heads can be furnished, or com-

bination side-heads that will perform both of these operations.

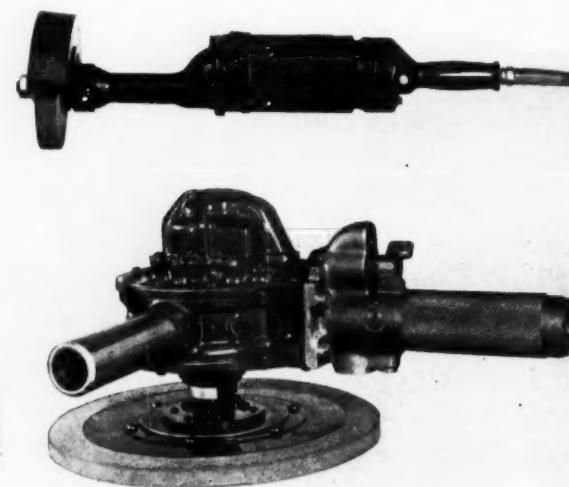
Safety devices are provided for the entire feed and power-traverse mechanism. An automatic feed control can be furnished which regulates the feed so as to maintain a constant horsepower input into any spindle, regardless of varying depths or widths of cut or differences in the hardness of the material being machined. This control also gives a visual indication of the horsepower input.—Booth No. 1012

### Rotor Electric and Air Tools

THE Rotor Air Tool Co., 5704 Carnegie Ave., Cleveland, Ohio, will feature for the first time a line of high-cycle electric tools that will augment its line of air tools. The line includes 4-, 6- and 8-inch grinders, 6- and 8-inch buffers, 7- and 9-inch disk sanders, and 6-inch right-angle grinders. These tools are made in two weights—13 and 15 pounds. The 6-inch, 13-pound grinder is shown in the upper view of the illustration.

The motor is of the welded copper squirrel-cage type. A new design has been adopted for retaining the stator firmly in the casing, so that it cannot work loose. Magnesium alloy, reinforced with ribs, is used in the handles and casing to give high strength with light weight. A new type of handle can be furnished to provide room for two fuses.

In the air tool line, the company will exhibit a new disk sander (lower view of the illustration) designated as Type B-1, which carries a 9-inch sanding pad and weighs only 10 pounds. The motor is of the twin-rotor external blade type. In this design, the object was to enable the operator to get over the work rapidly and to accurately control the pressure applied to the work for producing the desired finish. This has been accomplished by building the motor low and of large bore, so that the two handles, placed at right angles, are close to the work and make it possible to guide the tool with little effort. A new type four-port governor which responds instantly as the load is applied controls the free speed and reduces air consumption.—Booth No. E-314



*High-cycle Electric Grinder (Above) and Air Disk Sander (Below) Added to the Rotor Line*

## SOME OF THE MEN RESPONSIBLE FOR RESULTS IN THE MECHANICAL INDUSTRIES



*E. F. ROBERTS, Vice-President of Manufacture, Packard Motor Car Co., Detroit, Mich.*



*BERNHARD G. TANG, General Superintendent, General Electric Co., Schenectady, N. Y.*



*DONALD L. BROWN, Pres., United Aircraft Corp., and Pratt & Whitney Aircraft Co., East Hartford, Conn.*



*PRESTON R. BASSETT, Vice-Pres. in Charge of Engineering, Sperry Gyroscope Co., Inc., Brooklyn, N. Y.*



*T. I. PHILLIPS, Works Manager, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.*



*V. A. OLSEN, Works Manager of the Cadillac Motor Car Company, Detroit, Mich.*



*H. L. HORNING, President and General Manager, Waukesha Motor Co., Waukesha, Wis.*



*GEORGE A. SEVLER, Works Manager of the Lunkenheimer Company, Cincinnati, Ohio*



*H. F. HAGEN, Vice-President of the B. F. Sturtevant Co., Hyde Park, Boston, Mass.*

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## SOME OF THE MEN RESPONSIBLE FOR RESULTS IN THE MECHANICAL INDUSTRIES



*FRED M. ZEDER, Vice-President in Charge of Engineering, Chrysler Corp., Detroit, Mich.*



*A. S. HOWELL, Vice-President and Chief Engineer, Bell & Howell Co., Chicago, Ill.*



*ERIC P. TEEL, Vice President and General Manager, Novo Engine Co., Lansing, Mich.*



*© Blank & Stoller  
R. F. RUNGE, Vice-President of SKF Industries, Incorporated, Philadelphia, Pa.*



*© Loubell Studios  
C. L. RICE, Vice-President and Works Manager, Hawthorne Works, Western Electric Co., Chicago, Ill.*



*G. W. CODRINGTON, President of Winton Engine Corporation, Cleveland, Ohio*



*© Blank & Stoller  
R. J. BURROWS, President of Clark Tractor Co., Battle Creek, Mich.*



*GARDNER W. CARR, Vice-President in Charge of Manufacturing, Boeing Aircraft Co., Seattle, Wash.*

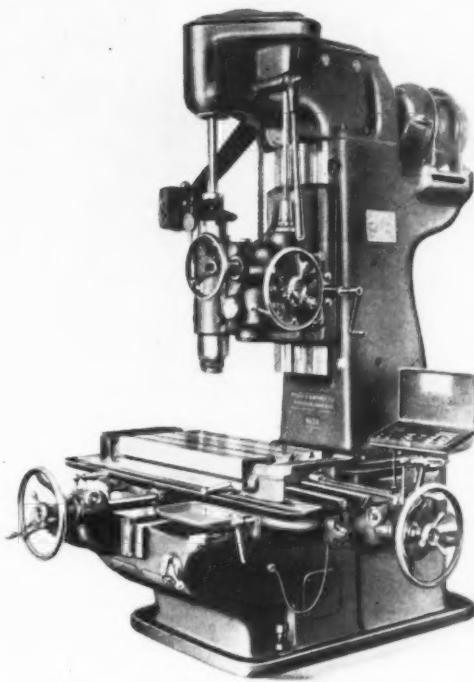


*P. H. MacGREGOR, General Plant Manager, Pontiac Motor Company, Pontiac, Mich.*

## *Pratt & Whitney Introduces a New Jig Boring Machine*

**A**JIG boring machine known as the No. 2-A jig borer has been introduced by the Pratt & Whitney Co., Hartford, Conn. This machine is designed on the same basic principles as previous jig boring machines built by the company; in addition, the new machine has been designed with many features especially intended to speed up production. A few of these are: Twelve spindle speeds, ranging from 37 to 1800 revolutions per minute; eight spindle feeds in either direction, ranging from 0.0005 to 0.010 inch for each spindle speed; motor drive to the spindle through hardened and ground helical gears; "shockless" insulated motor and spindle drive; hardened, ground, and lapped spindle quill; spindle mounted in permanently sealed ball bearings; depth dial indicator; direct-reading ten-thousandth inch dial indicators built into each table slide; built-in electric lights; provision for tool changes made in the spindle nose; three-point adjustable bearing on the floor for quick

and accurate leveling of the machine.



## *Improvements that Speed Up Production are Features of the New P & W Jig Borer*

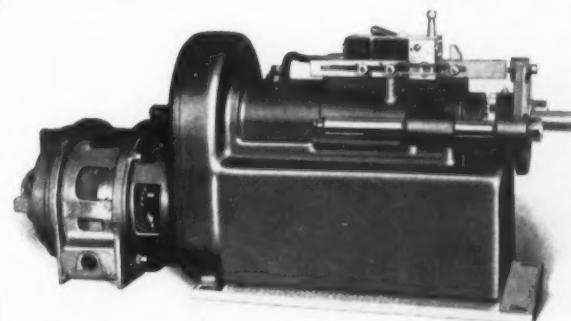
and accurate leveling of the machine.

7116 pounds, including motor. The No. 3644 machine weighs 8025 pounds, including motor.—  
*Reed, No. 906.*

## *Hoefer Self-Contained Hydraulic-Feed Drilling Unit*

**A** SELF-CONTAINED motor-driven drilling unit with hydraulic feed for the spindle will be shown by the Hoefer Mfg. Co., Inc., Freeport, Ill. The hydraulic feed can be adjusted to give rapid approach, slow feed, and rapid return movements. The mechanism can be arranged to stop after completing this cycle of operations or to operate continuously. It can also be set for rapid approach and rapid return for the full traverse of the spindle or any part of the traverse. Thus the unit can be used for lapping or similar operations, as well as for drilling.

These units are obtainable in sizes from 1 1/2 to 10 horsepower, and can be used in the horizontal, ver-

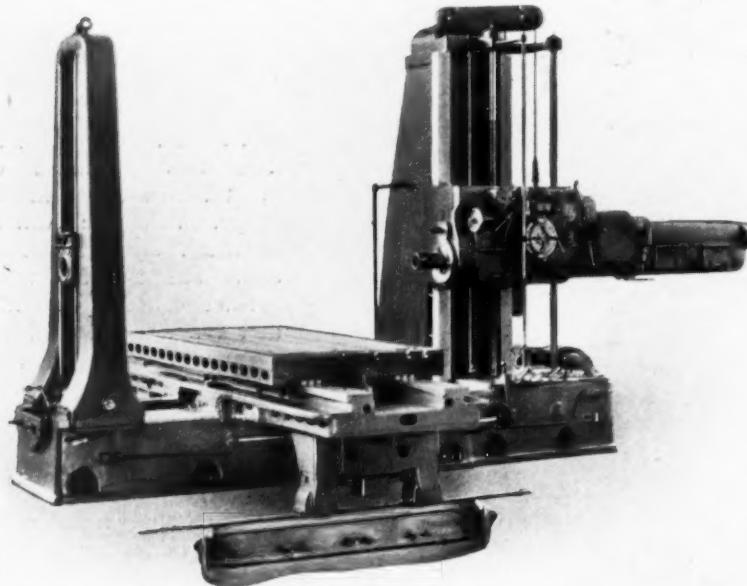


## *Hoefer Motor-driven Hydraulically Fed Drilling Unit*

tical, or any angular position. Any number of these units of the same or different sizes can be assembled on any available machine, or a simple base can be provided for the mounting of the units. The units are especially designed to use the multiple-spindle heads of this company's manufacture.

The base of the unit contains an oil sump. The motor is connected to an intermediate shaft driving the geared oil-pump, and, through gears, the main spindle.

While the rapid approach and withdrawal speed is constant—40 inches per minute—the rate of the working feed can be changed instantly from 0 to 40 inches per minute. Pick-off gears are provided, which permit varying the spindle speed to suit requirements.—*Booth No. 12*



*Giddings & Lewis Boring, Drilling, and Milling Machine Having Various New Features*

### *Giddings & Lewis Horizontal Boring, Drilling and Milling Machine*

A HORIZONTAL boring, drilling, and milling machine, known as the No. 350-T table type, will be exhibited by the Giddings & Lewis Machine Tool Co., Fond du Lac, Wis. The special features of this machine are the two-spindle design; directional control; independent operation of table, saddle, and headstock units; depth gage with automatic trip; and rotary speed and feed selectors with direct-reading dials.

With the two-spindle design, boring and heavy milling are performed with the large main spindle running at speeds up to 500 revolutions per minute, while high-speed drilling, tapping, and milling are carried out with the small, light, sensitive, high-speed spindle, which can be easily reversed at speeds up to 1500 revolutions per minute.

"Directional control" is a term used to describe the tying up of the various levers operating the table, saddle, and headstock units in such a manner that the units always move in the direction in which the levers are actuated. Safety trips limit the movement of the units.

By cranking the selective levers for speeds and feeds either forward or backward, nine changes of speeds or feeds are obtained. A single back-gear for the feeds doubles the number of feeds, giving eighteen inde-

pendent feeds to each spindle speed. Two sets of back-gears, in conjunction with the speed selector, provide thirty-six separate spindle speeds. All of these speeds and feeds are available for both the main and high-speed spindles.

Some of the specifications are: Longitudinal travel of main spindle, 24 inches; longitudinal travel of high-speed spindle, 9 inches; center distance between spindles, 7 inches;

maximum distance from top of table to center of main spindle, 24 inches; maximum distance from top of table to center of high-speed spindle, 31 inches; working surface of table, 30 by 60 inches; cross-travel of table, 48 inches.

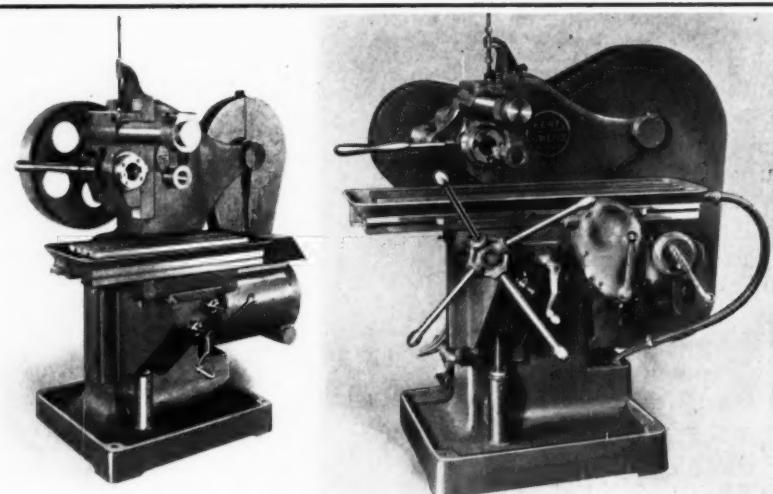
The same concern will also exhibit a No. 350-FQ floor type horizontal boring, drilling, and milling machine having the same features as the No. 350-T table type. However, the floor type machine is built with an adjustable quill having a sliding spindle.—Booth No. 110

### *Kent-Owens Milling Machines*

TWO new milling machines will be exhibited by the Kent-Owens Machine Co., 958 Wall St., Toledo, Ohio. One is an automatic cam-controlled feed machine (the No. 26) and the other, a machine with instantaneous feed change (the No. 3RQ).

In the cam-controlled machine, the cam is laid out to meet the customer's requirements for a special operation. Provision is made for disengaging the cam so that the table can be put through its cycle by hand when setting up the work. The construction of the machine permits of placing a fixture on each end of the table, so that while one piece is being milled, the operator can load and unload the other fixture. This machine is especially intended for large production requirements.

The No. 3 RQ machine has an instantaneous feed change, permitting



*Kent-Owens Milling Machines with Cam-controlled Feed (Left) and with Instantaneous Feed Change (Right)*

the operator to control the feed while the machine is in operation. The feed is arranged to operate the table in both directions. An infinite range of feeds is available. The instantaneous feed change is especially advantageous for milling parts having variations in section—that is, where the amount of stock to be removed is variable. The operator can instantly increase the feed when small amounts are to be removed, and when the cutter reaches a heavy section, he can instantly reduce the feed.—Booth No. 105



*Baker-Raulang Truck of Streamline Design and Five Tons Capacity*

### **Streamline Five-Ton "Hylift" Truck**

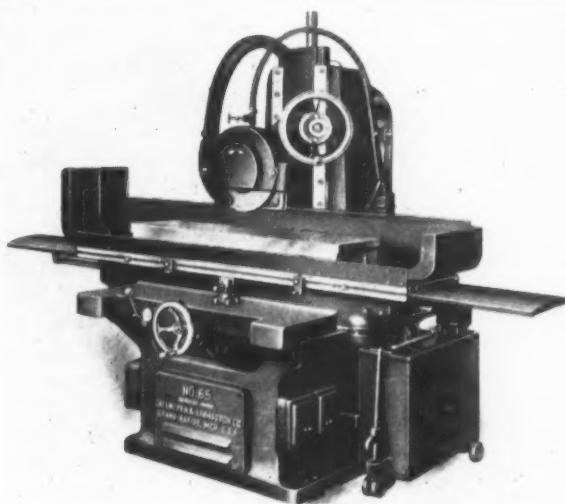
THE appearance of the streamline five-ton Hylift truck to be exhibited by the Baker-Raulang Co., 2168 W. 25th St., Cleveland, Ohio, is entirely in keeping with the modern trend toward clean design. All sharp angles have been eliminated by placing as many of the controlling and operating parts as possible within the battery compartment enclosure. With this truck, hoisting is accomplished by two double alloy steel roller chains which have a capacity of 46,000 pounds, giving a factor of safety of 9.2.

Movement of the platform is restricted within the upper and lower limits of travel by cut-out control switches. Further protection is provided by an over-running clutch in the hoist unit. Both the travel and hoist motors have an overload capacity of 300 per cent of the rated load for thirty minutes.—Booth No. E-212

THE latest addition to the line of hydraulic-feed machines built by the Gallmeyer & Livingston Co., 350 Straight Ave., S.W., Grand Rapids, Mich., is the No. 65 surface grinder, which is the largest of the company's surface grinders. The working surface of the table is 12 by 48 inches. The maximum distance from the wheel to the table, with a 12-inch wheel, is 17 inches. The vertical

pointer, giving a vernier effect. This patented feature makes it possible to read to 0.0001 inch, with the thousandths graduations over  $1/8$  inch apart.

The machine is equipped with a Vickers vane type hydraulic pump and relief valve, enclosed within the column. All belts and chains are eliminated in the driving of the hydraulic mechanism.



*Gallmeyer & Livingston Hydraulic-feed Surface Grinder*

movement of the wheel-head is 18 inches. Aiming at rigidity as well as capacity, the machine is built around a rigid one-piece column and base casting weighing about 3000 pounds. Practically every longitudinal speed up to the maximum of 125 feet per minute is obtainable. The cross-feed of the machine is automatically operated.

A special feature is the method of raising and lowering the wheel-head. A large handwheel, graduated in one-quarter thousandths of an inch, with a movable pointer which can be set for convenient readings, provides for accurate rapid adjustment. For very accurate readings, a smaller handwheel or knurled knob in the center of the large handwheel is used. The disk in the center of this handwheel has a graduated dial which can be set to zero in relation to the pointer mounted on a spoke of the large handwheel. Both the inner and outer wheels turn, but the graduations on the inner wheel are arranged to read on the moving

A V-belt drive to the grinding wheel spindle is provided from a motor mounted on an adjustable bracket attached to the head of the machine. This construction provides two spindle speeds. If desired, the machine can be equipped with a motor mounted directly on the spindle.—Booth No. 307

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***Prosperity cannot be promoted by simply taking from one and giving to another. It can be promoted only by increasing the total of the products to be distributed; and this increase requires the application of better machinery and methods.***

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## Bridgeport Hydraulic Face and Shear Blade Grinder

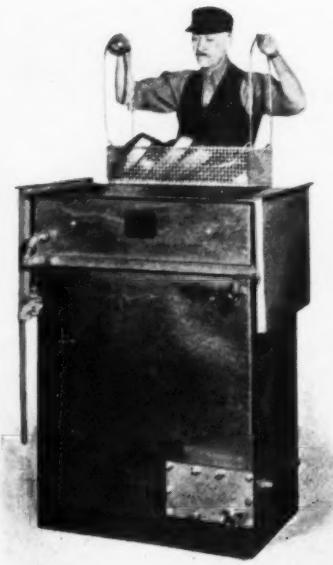
A HEAVY-DUTY face and shear blade grinder known as Type 75 is being exhibited by the Bridgeport Safety Emery Wheel Co., Inc., 1283 W. Broad St., Bridgeport, Conn. The outstanding features of this machine are a high-speed carriage travel, secured through the use of an Oilgear pump and oil motor; forced-feed lubrication of the vee and flat ways and guards that protect the ways from dust and grit; a holding fixture that consists of a center-control double-face magnetic chuck for holding flying shears and other knives with beveled edges, which chuck is lined up with the angle-bars for grinding long squaring shears; and a Timken-equipped spindle.

The machine is adapted for the accurate grinding of flat surfaces in general, either by holding the work on the table itself, in a special fixture, or on magnetic chucks. In the illustration, the machine is equipped for grinding shear blades. The center section shown is the double-face center-control revolving magnetic chuck for holding flying shears.

The forced-feed lubrication system is designed along the lines used on

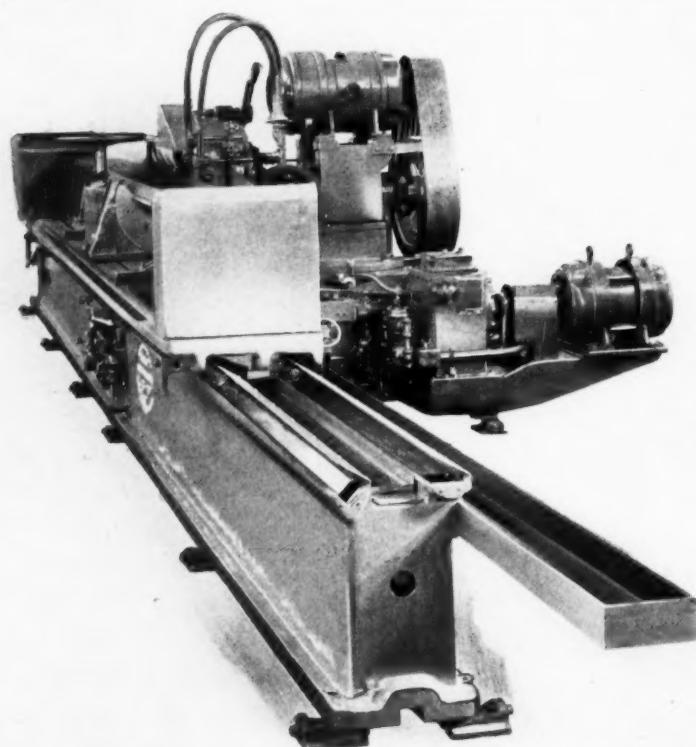
Gray planers, and manufactured under the Gray patent. A Purolator cleans the oil.

Through the use of the Oilgear equipment, the carriage may be driven at any desired speed up to 90 feet per minute. The speed is changed by the operator by simply turning a handwheel. The movement of the grinding wheel to the work is also controlled by the hydraulic unit. This machine is made in various lengths from 60 to 216 inches.—Booth No. 25



## Blakeslee Vapor Degreasers

A NEW method of cleaning metal parts that involves the use of a chlorinated solvent known as "Blacosolv" is the basis of the degreasers to be exhibited at the Show by G. S. Blakeslee & Co., 19th St. and 52nd Ave., Chicago, Ill. The solvent is non-inflammable and non-explosive and renders the parts chemically clean and dry.



Bridgeport Face and Shear Blade Grinder which Operates at Carriage Speeds up to 90 Feet a Minute

## Equipment that Degreases Metal Parts in Vapor

The machine shown in the illustration is known as the No. 2 vapor degreaser. It is suitable for parts of 18 to 20 gage or heavier. For materials of a lighter gage, a liquid-vapor degreaser is made, in which the work is simply dipped in the boiling solvent and rinsed in chemically pure vapors which contain no oils or greases. The solvent is heated by steam, gas, or electricity.

The working space required by the degreaser shown is 30 inches long by 18 inches wide by 24 inches deep. This machine can clean up to 1250 pounds per hour.—Booth No. E-202

## Hobart Arc Welders Built with Turret Tops

THE arc welding machines to be exhibited by Hobart Bros., Hobart Square, Troy, Ohio, will have the new turret top design developed by this company. Seven different sizes of machines ranging from 75 to 600 amperes capacity will be built with the new turret top design, previously described in the technical press. The advantages of this design are that everything, including the stabilizer, will be enclosed under the turret top. The addition of the "lifting eye" to all models is also a recent improvement. The placing of the stabilizer on top eliminates the possibility of its magnetic fields picking up welding wire stubs or other articles from the floor.—Booth No. E-103

## SOME OF THE MEN RESPONSIBLE FOR RESULTS IN THE MECHANICAL INDUSTRIES



*F. T. ELLIS, Superintendent of Production, Cadillac Motor Car Co., Detroit, Mich.*



*L. E. OSBORNE, Manager, East Springfield (Mass.) Works, Westinghouse Electric & Mfg. Co.*



*G. T. CHRISTOPHER, Assistant Vice-President of Manufacture, Packard Motor Car Co., Detroit, Mich.*



*J. S. MCKENNEY, Works Manager of the Apex Rotarex Corporation, Cleveland, Ohio*



*DAVIS A. WALLACE, Vice-Pres. in Charge of Mfg., Chrysler & DeSoto Div., Chrysler Corp., Detroit, Mich.*



*C. E. WETHERALD, Vice-President and General Manufacturing Manager, Chevrolet Motor Co., Detroit, Mich.*



*DONALD GAVIN SMELLIE, Chief Engineer, Hoover Co., North Canton, Ohio*



*A. C. DANEKIND, Chairman, Mfg. Pract. & Equipmt. Committee, General Electric Co., Schenectady, N. Y.*



*J. Q. SALISBURY, Supervisor of Machining and Tool Div., National Cash Register Co., Dayton, Ohio*

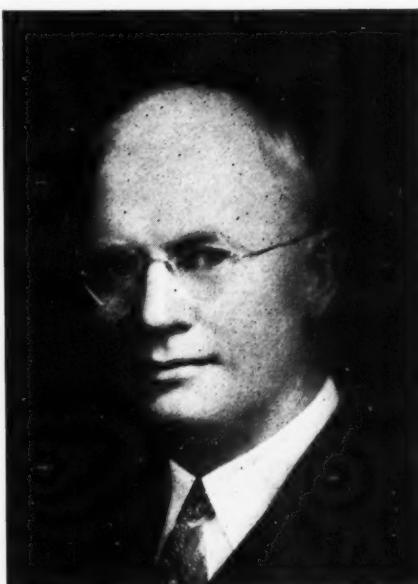
## SOME OF THE MEN RESPONSIBLE FOR RESULTS IN THE MECHANICAL INDUSTRIES



CHARLES M. GEARING, General Works Manager, New Departure Mfg. Co., Bristol, Conn.



© Fernand de Guelde  
J. H. COLLIER, Vice-President in Charge of Manufacturing Division, Crane Co., Chicago, Ill.



JOHN P. MAHONEY, V. P. in Charge of Manufacturing, Bendix Products Corporation, South Bend, Ind.



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C. A. BORTON, Vice-President in Charge of Production, Autocar Co., Ardmore, Pa.



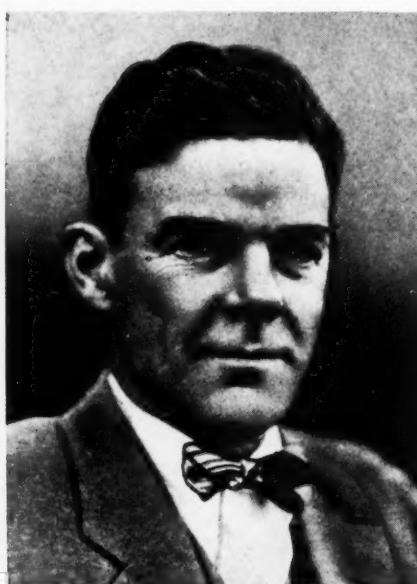
W. F. TITUS, Asst. to President, in Charge of Manufacturing, International Business Machines Co., Endicott, N.Y.



B. H. ANIBAL, Vice-President in Charge of Engineering, Pontiac Motor Co., Pontiac, Mich.



OTTO W. BUENTING, Vice-Pres. in Charge of Manufacture, Westinghouse Air Brake Co., Pittsburgh, Pa.



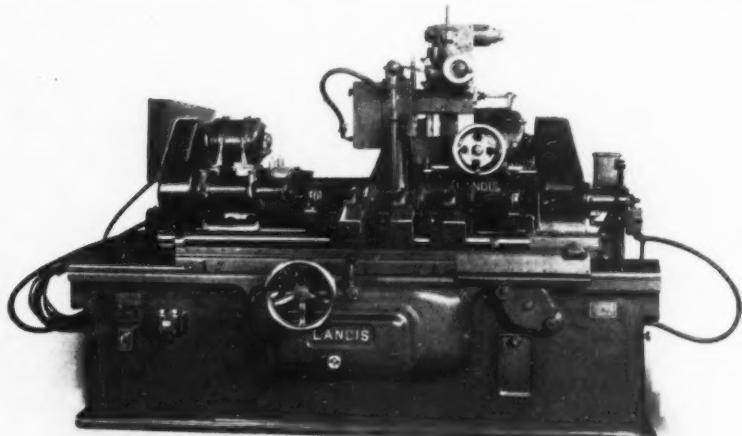
R. A. VAIL, Vice-President in Charge of Production, Studebaker Corporation, South Bend, Ind.



W. S. McINTOSH, Works Manager of the S. A. Woods Machine Co., Boston, Mass.

## Landis Semi-Automatic Hydraulic Grinder for Multi-Diameter Shafts

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*Landis Grinder Designed for the Rapid Finishing of Shafts to Various Diameters with One Set-up of the Work*

MULTI-DIAMETER shafts, such as camshafts with bearings of different sizes, can be ground in one set-up and with no loss of time due to different diameters in a 10-inch Type C hydraulic grinder to be exhibited by the Landis Tool Co., Waynesboro, Pa. The machine illustrated is tooled to grind all five main bearings of the camshaft for a well-known engine. For this work, the operator simply places the camshaft in the cradle on the machine and throws over the starting lever. The machine automatically locates the work for grinding each bearing, one after the other, until all are finished to the correct size. When the last bearing has been ground, the work moves back to the starting position. The operator then throws the lever back, causing the shaft to stop rotating and drop into the cradle, from which it is removed and replaced with the next shaft to be ground.

The grinding operation is controlled by the well-known Landis-Solex sizing device, which allows the wheel to advance rapidly to the work and then slow down to a rough-grinding speed until the work is within 0.002 inch of size. The sizing device then functions, causing the inward feeding motion to slow down further, and finally, when the exact size has been reached, the wheel-base is moved back rapidly to its starting position. After the base reaches its starting position, the table traverses, bringing the next bearing on the

shaft in front of the grinding wheel. While this is taking place, the sizing head used in connection with the bearing just ground moves back to its inoperative position, while the sizing head to be used in connection

with the bearing about to be ground moves forward to its operative position. From this point on the grinding proceeds as with the first bearing on the shaft, this being repeated for each successive bearing.

A new feature of the hydraulic in-feed compensates for the difference in the position in which grinding begins when multi-diameter work is being ground. With the usual arrangement, the feed engages at the same point for each bearing, regardless of the diameter. Thus, for the smaller bearings, the base would have to feed inward a short distance at the slow grinding feed before the wheel came in contact with the work, materially decreasing production. To eliminate this loss of time, a movable bar, in which pins of different lengths are inserted, is located underneath the wheel-base. Movement of the bar is timed with the traverse of the carriage, so that the correct pin is brought into play for each different diameter ground. These pins control the point at which grinding begins.

—Booth J-K

## Illinois Die-Filing Machine with Forced Lubricating System

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ON a die-filing machine to be shown by the Illinois Tool Works, 2501 N. Keeler Ave., Chicago, Ill., all moving parts are oiled by a forced lubricating system in such a way that the oil takes up the impact of the spindle. This provision results in a very smooth-running machine.

The motor is of 1/4 horsepower and runs at 1750 revolutions per minute. Two speeds of operation—450 and 600 strokes per minute—are obtained through the V-belt drive. The length of the stroke is 1 1/2 inches.

The table is 12 inches in diameter and tilts 20 degrees in two directions. The hole in the table is provided with a bushing that is removable to accommodate large files, saws, or stones. The over-arm of the machine can be readily removed when large work is to be handled. Any type or size of file can be used that can be held in a 1/2-inch chuck.

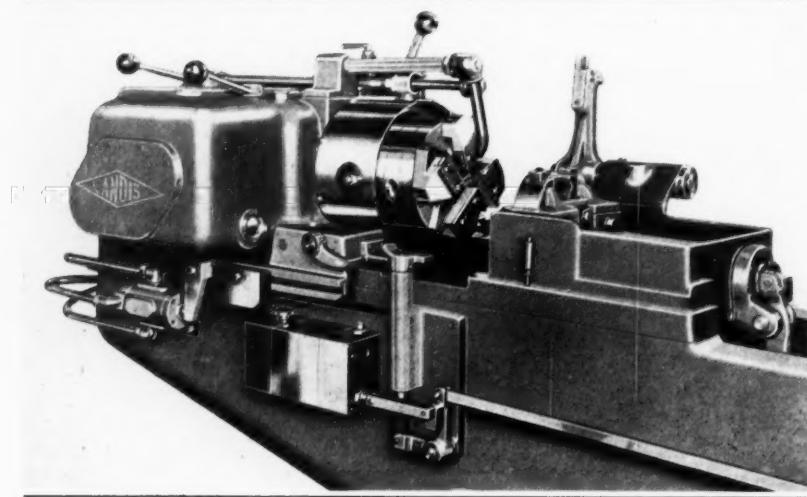
The height to the top of the table

is 12 1/2 inches and to the over-arm, 25 inches. The machine weighs 125 pounds.—Booth No. 303



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*Die-filing Machine Designed for Smooth Running*



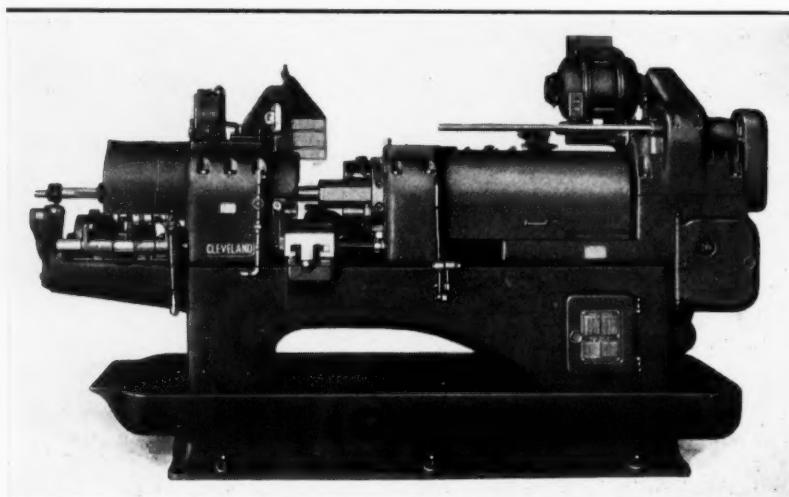
*"Lanhydro"—a Thread-cutting Machine that is Hydraulically Operated*

### *Landis Hydraulically Operated Threading Machine*

WHAT is believed to be the first commercially built thread-cutting machine to which hydraulic power has been applied will be one of the exhibits of the Landis Machine Co., Inc., Waynesboro, Pa. Although designed primarily for automotive work, this machine is applicable to any threading job requiring accurate economical production. It is known as the "Lanhydro," and is an adaptation of the Landmaco threading machine built by the company for a number of years past.

A hydraulically operated mechanism can be furnished to provide automatic magazine feed and automatic carriage feed and return. With the hydraulic mechanism, the opening

and closing of the die-head are controlled mechanically, while the gripping and releasing of the work and the engagement of a lead-screw attachment, if furnished, are accomplished hydraulically. When equipped with a magazine feed, the cycle of operations is entirely automatic. Thus, the machine can be used as a full-automatic or a semi-automatic machine, depending on the requirements or type of work handled. The application of hydraulic power permits a wide range of work to be handled and enables changes in set-up to be readily accomplished. It is planned to build the machine in 1-, 1 1/2-, 2-, and 2 1/2-inch sizes.—Booth No. 204



*Cleveland Automatic of Improved Design which is Built in Many Sizes*

### *Cleveland Model K Automatics*

UNUSUAL rigidity resulting from making the bearings for the spindle and tool turrets integral with the main bed and frame is claimed for the Model K multiple-spindle automatics being placed on the market by the Cleveland Automatic Machine Co., 2267 Ashland Road, Cleveland, Ohio. This construction insures true alignment of the spindles with the turret bearings. The main casting is a nickel alloy.

The initial drive is through a multiple-disk clutch having unusually wide driving surfaces. Thence power is transmitted through helical gears and shafts running in anti-friction bearings. A long lever connected to the power clutch permits of starting and stopping the machine from the operating position and facilitates setting up.

The two camshafts are located at the rear of the machine above the chip space, where the cams are fully visible for making adjustments when necessary. The upper camshaft carries the cross-slide, tool turret, and auxiliary spindle drums, while the lower shaft carries the work-spindle indexing lever and wedge-operating mechanism, the stock feed, and chuck-operating drums. The tool feed is designed for either universal or special cams, the universal cams being designed to handle any job within the capacity of the machine.

Threading, reaming, high-speed drilling, and accelerated tool-spindles are operated through the main turret, but their action is independent of the turret movements. Plain and universal types of threading spindles are available. The main tool turret is ground to size and travels in a wide bearing in the machine housing. It is further supported by a hardened and ground steel sleeve which passes through the center of the tool turret and into the work-spindle turret. The auxiliary tool turret is pressed into and keyed to the main tool turret. Top slides mounted over the work-spindles afford tool positions for forming, shaving, cutting-off, and similar operations. Cross-slides are, of course, also provided.

Four-spindle types of these automatics are built in fourteen sizes ranging from 5/8 inch to 3 3/4 inches, inclusive, while six-spindle types are available in eight sizes from 5/8 inch to 2 1/4 inches. The sizes indicate the chuck capacity for round stock.—Booth No. 20

## Cincinnati Tool-Room and Heavy-Duty Lathes

**A**N 18-inch tool-room lathe and a 22-inch geared-head heavy-duty lathe provided with many improved features have been brought out by the Cincinnati Lathe & Tool Co., Oakley, Cincinnati, Ohio. These two lathes are of the same general design. Twelve spindle speeds are obtainable by shifting three levers, any speed being selected directly. The number of spindle speeds, as well as the speed range, can be considerably increased if required. Through the quick-change gear-box, from thirty-two to ninety-six changes are made, to secure any thread desired, by simply shifting two levers.

An important patented feature of these lathes is the plunger for locking the spindle when removing chucks and faceplates. The use of this plunger keeps the strain off the gears and shafts in the head.

A clutch of the compression disk type transmits the full horsepower from the motor. It is operated by a lever on the apron or on the top of the head for starting and stopping the lathe at once. This arrangement prevents "drifting" and accidental starting. Automatic force-feed lubrication is provided in the quick-change gear-box, spindle bearings, bed, carriage, apron, compound rest, and train of gears at end of the lathe.

The 18-inch lathe is fitted with anti-friction bearings in the headstock, change-gear box, and apron units. The 22-inch lathe is fitted with a special double rest, permitting simultaneous use of several tools.

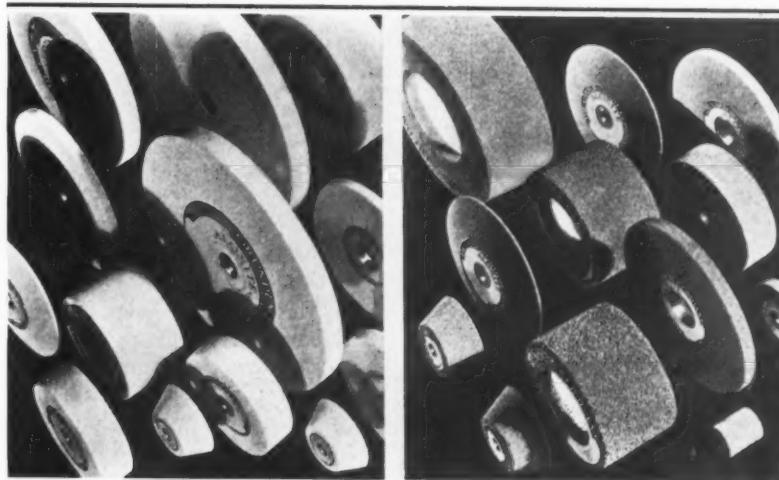
The beds are made from an 80 per cent steel with one per cent nickel alloy metal, and have cross girths 15 inches apart.—Booth No. 11

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**Improvement in material well-being depends on increasing production in a day or in a week, so that more can be bought with a day's or with a week's wages. Recovery and improved living will come only with increased production.—**

George P. Torrence

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White Aloxite Brand AA  
Grinding Wheels

Light Blue 270 Bond  
Grinding Wheels

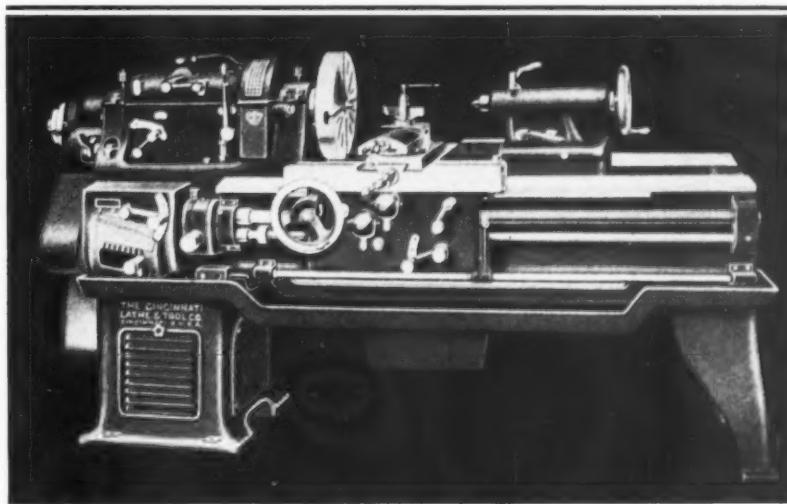
## Carborundum Grinding Wheels for the Tool-Room

**A**MONG the new wheels to be featured by the Carborundum Co., Niagara Falls, N. Y., are the Aloxite brand AA tool-room grinding wheels which embody several improved features. These AA wheels have a pure white color and are made in combination with the new 170 bond which produces a free-cutting wheel that requires less grinding pressure. These wheels are flexible in their application and take light and heavy cuts with the same efficiency and low wheel wear. They can therefore handle a wider range of steels and wider areas of contact. It is claimed that they require less dressing, save operating time, save diamonds, and generate less heat.

Another tool-room wheel shown is

the new 270 bond wheel. This has a light blue color and is intended as a production wheel for the tool-room. It is made from a new type of aluminum oxide abrasive combined with the 170 bond, and is intended particularly for the grinding of duplicate parts. It has the same general qualities as the AA wheel, but is not quite so flexible in its applications, since it is especially intended for production work.

The Carborundum exhibit also will include a demonstration of diamond wheels for cemented-carbide tools, a complete assortment of improved disk wheels for surface grinding, and about one thousand examples of ground work in all finishes.—Booth No. E-408



Completely Automatic Lubrication is a Feature of the Cincinnati Lathes to be Exhibited

### National Acme Single-Spindle Automatic Screw Machine

MANY pieces made on automatic screw machines are essentially simple, requiring only forming, drilling, and cutting off. Hence, there is a wide field for a simple, inexpensive machine that is easily tooled up and sufficiently rugged so that the cutting tool can be pushed to the highest practicable speeds. To meet these requirements, the National Acme Co., 170 E. 131st St., Cleveland, Ohio, will demonstrate at the Show a new single-spindle, automatic screw machine. Mounted on a heavy base, the working parts of this machine are waist high, and so arranged that the operator can oversee the details of the operation from one position.

In order to reduce the time required for restocking, provision is made for handling 20-foot lengths of bar stock. The method of feed used eliminates the usual pusher and pusher tube, feeding cam and roller, etc. The chucking mechanism is operated by a cam-drum on the headstock of the machine; a hand-lever is provided for hand chucking.

The stock is fed out against the drill in most cases. When drilling is not required, as in cutting off pins, for example, a stock stop is mounted in the drilling spindle. A separate, independently cammed disappearing stock stop is available as optional equipment. The drill spindle may be stationary or rotating.

When changing over from one job to another, the operator can adjust the depth of the hole to be drilled by turning an adjusting screw on the front of the machine without changing the cam. A pin is provided at the front of the spindle operating lever so that, by lifting out this pin, the operator can slide the spindle back to replace or examine the drill without in any way disturbing the adjustment.

Two cross-slides are mounted rigidly on the face of the heavy box

form casting that encloses the gears. One of these slides carries the chamfering or forming tool, and the other the cut-off tool. Each slide is independently operated. For convenience in setting up, a crank and squared shaft are provided for turning the machine over by hand. The spindle speeds are varied by changing the drive sprocket in the gear-case, which can be quickly done. Change-gears in the gear-box permit changing feeds of the cross-slides.

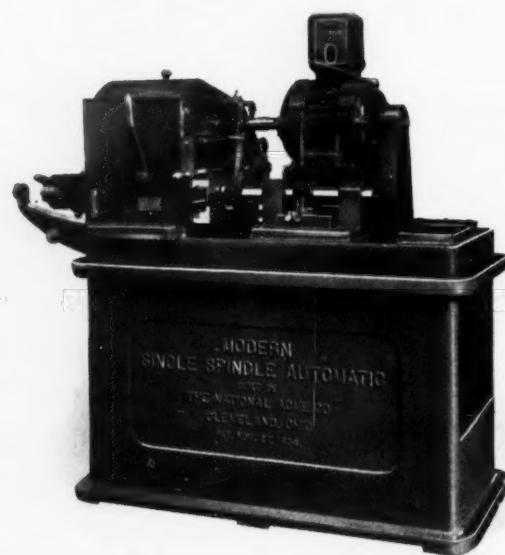
The main claims made for the machine are its great simplicity, the accessibility of all of its parts, and the fact that changes in set-up can be quickly made.—Booth No. 601

### Brown & Sharpe Hydraulic Type Surface Grinding Machine

A No. 5 surface grinding machine with a hydraulically operated table will be exhibited by the Brown & Sharpe Mfg. Co., Providence, R. I. The new design provides a rugged type of machine for both the tool-room and manufacturing departments. Rigidity is a feature of the design, especially in the support of the table. In addition, the wheel-spindle is carried in a vertical slide of unusual width and length, assuring accurate alignment.

The spindle unit is of the cartridge type, easily removed for adjustment. The table is hydraulically operated,

providing any desired longitudinal feed up to 60 feet per minute, and any desired rate of automatic transverse feed up to 0.15 inch per reversal of longitudinal travel. Hand-wheels are provided for both movements to facilitate rapid settings. The wheel-spindle is driven by a 1 1/2-horsepower motor, mounted at the lower end of the wheel-slide, a separate motor being used to operate the pump for the hydraulic feeds of the table. The machine will grind work 24 inches long, 8 inches wide, and 11 inches high, using a 10-inch wheel.—Booth No. 27



Single-spindle Automatic Developed by the National Acme Co. for Simple Operations



B & S Hydraulic Surface Grinder Intended for Both Tool-room and Manufacturing Use

## SOME OF THE MEN RESPONSIBLE FOR RESULTS IN THE MECHANICAL INDUSTRIES



A. H. BAINTON, Works Manager  
of the Brown & Sharpe Mfg. Co.,  
Providence, R. I.



O. V. BADGLEY, Factory Manager  
of the Delco-Remy Corporation,  
Anderson, Ind.



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DONALD F. CARPENTER, Director  
of Manufacturing, Remington Arms Co.,  
Bridgeport, Conn.



RUSSELL V. POLEN, Assistant Works  
Manager of the Frigidaire Corporation,  
Dayton, Ohio



LOUIS THOMS, Chief Engineer,  
Graham-Paige Motors Corporation,  
Detroit, Mich.



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DAN C. TEETOR, Works Manager  
of the Perfect Circle Company,  
Hagerstown, Ind.



ALFRED E. GIBSON, Vice-President  
and Asst. General Manager, Wellman  
Engineering Co., Cleveland, Ohio



ROGER HEALD, President and Head  
of Engineering Department, Heald Ma-  
chine Co., Worcester, Mass.

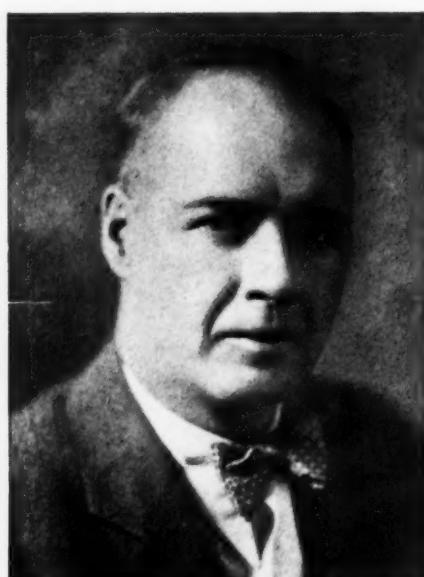


WILLIAM R. HOYT, Works Manager,  
Philadelphia Division, Yale & Towne  
Mfg. Co., Philadelphia, Pa.

## SOME OF THE MEN RESPONSIBLE FOR RESULTS IN THE MECHANICAL INDUSTRIES



F. E. MUNSCHAUER, Works Mgr.,  
Secretary and Treasurer, Niagara  
Machine & Tool Works, Buffalo, N. Y.



NEWTON FIELD HADLEY, Chief  
Engineer, Plymouth Motor Corporation,  
Detroit, Mich.



CHARLES E. VAN NORMAN, Presi-  
dent, Van Norman Machine Tool Co.,  
Springfield, Mass.



A. H. McDougall, Vice-President  
and Consulting Engineer, Whiting Corp.,  
Harvey, Ill.



E. L. BERRY, Superintendent and  
Production Manager, Pershing Road  
Plant, Link-Belt Co., Chicago, Ill.



R. J. EMMERT, Factory Manager  
of the General Motors Truck Co.,  
Pontiac, Mich.



R. H. CRAMER, Manager, Methods  
and Equipment, Hyatt Roller Bearing  
Co., Harrison, N. J.



RAY T. DEVOE, General Superin-  
tendent of the Marvel Carburetor Co.,  
Flint, Mich.



EARLE KOONZ, Works Manager of  
the Greenfield Tap & Die Corporation,  
Greenfield, Mass.

## Three New Developments in the Sundstrand Exhibit

**A**N automatic 10-inch stub lathe to be shown by the Sundstrand Machine Tool Co., 2530 Eleventh St., Rockford, Ill., is not only a new size of machine, but in some respects a new type as well. It is illustrated in Fig. 1. This machine has an operating cycle which is fully automatic from the time that the tools start their movement until they have completed the cut and have returned to the starting position. The operating cycle includes a rapid approach, an in-feed to depth, turning, facing, tool relieving, etc., a quick return, and stopping. By the simple adjustment of a dog, the cycle can be arranged to repeat itself when automatic work-handling attachments are employed.

Four models of this machine are available with different ranges of spindle speeds. Each model is built in various lengths. Speeds, feeds, and carriage movements can be adjusted in a few minutes to meet the requirements of a wide variety of work. The convenient set-up feature, together with the automatic cycle and high-speed shockless rapid traverse, adapts the machine to efficient operation on relatively short runs.

The company is also introducing the No. 2 automatic Electromil, shown in Fig. 2, which is a small Rigidmil equipped with an automatic electric table control for the high-speed milling of parts for business machines, household appliances, electrical apparatus, firearms, small ma-

Fig. 1. Sundstrand 10-inch Stub Lathe Designed for Easy Set-up and Full-automatic Operation

chines, tools, and the like. This machine can also be quickly set up or changed from one job to another, so that it can be effectively used to obtain low-cost production on parts manufactured in small quantities.

The table control is practically instantaneous in operation, yet smooth and shockless. Flexibility is another feature of the control, as any combination of table movements within the capacity of the machine can be obtained quickly. The spindle head is available in low-speed, medium-speed, and high-speed types. Micrometer dials provide for accurate adjustment of the table, the quill, and the spindle head.

Fig. 3 shows a hydraulic sliding-head unit which is suitable for boring, drilling, reaming, spot-facing, milling, and similar operations. This unit is built in standard sizes of 5, 7 1/2, 10, 15, and 20 horse-

power. The head has a direct-connected motor drive, the spindle being rotated through a floating coupling and pick-off gears.

The automatic operating cycle of this unit includes a rapid approach to the work, a feed, a slower feed and dwell, or a dwell only (as desired), a rapid return, and stopping. Both feed movements can be adjusted throughout their entire range by two knobs. The operation of the feed and rapid traverse sequence is controlled by adjustable dogs. A rapid traverse between intermittent cuts can be provided. Hydraulic power for feeding is supplied by a variable-displacement, multi-piston pump, and for rapid traversing, by a Rota-Roll constant-displacement pump. Both pumps are in a single housing, mounted with the controls on a panel that forms one side of the head.—Booth No. 306

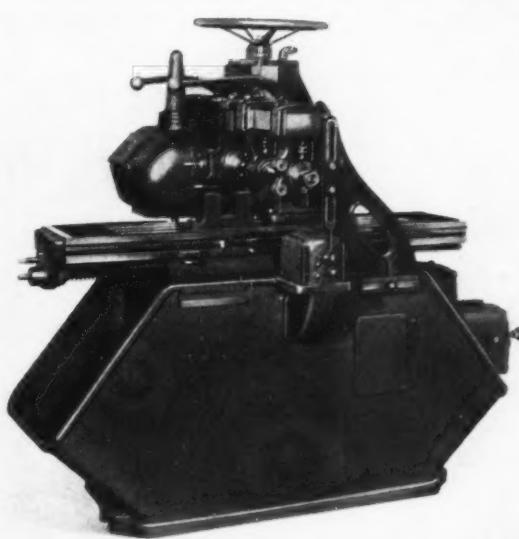


Fig. 2. Automatic Electromil Adapted to the High-speed Milling of Large or Small Lots

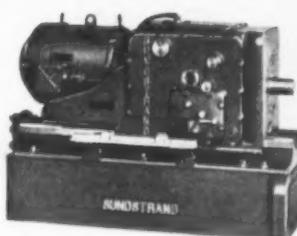
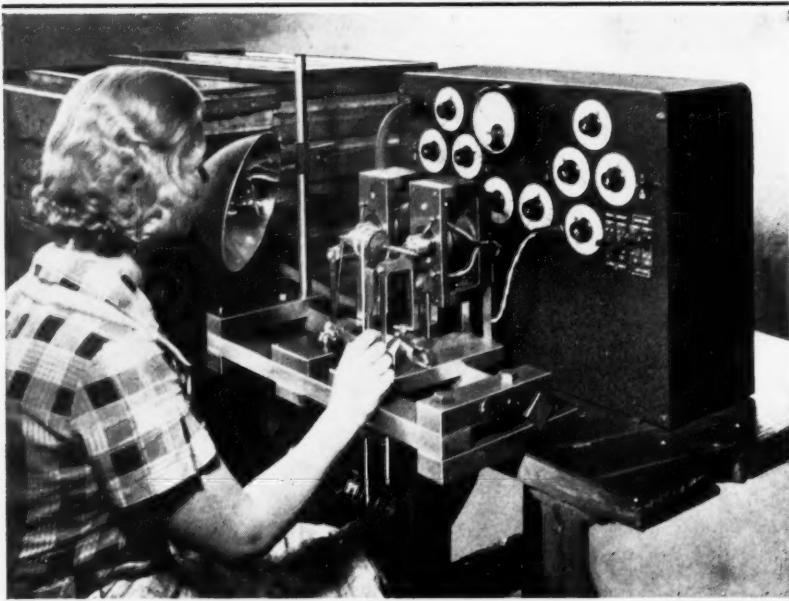


Fig. 3. Hydraulic Sliding-head Drill Unit



*Westinghouse Balancing Machine which Shows Visually the Point of Unbalance*

### *Westinghouse Electro-Dynamic Balancing Machine*

**A**N electronic, dynamic balancing machine, developed by the Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., which has saved as much as 50 per cent of the balancing cost in production set-ups will be displayed for the first time at the Machine Tool Show. With the aid of a stroboscopic tube, the point of unbalance is visible during the balancing operation, and the amount of unbalance is read directly on a calibrated meter. The machine has been applied to small rotors from 1 1/4 to 3 inches in diameter; to medium-size rotors up to 100 pounds in weight; and to very large turbo-generator rotors weighing as much as 125 tons. The machine makes it possible to make an unbalance determination without calculation with a rotor running in its own bearings, and with rotors running at very high speeds—over 10,000 R.P.M.

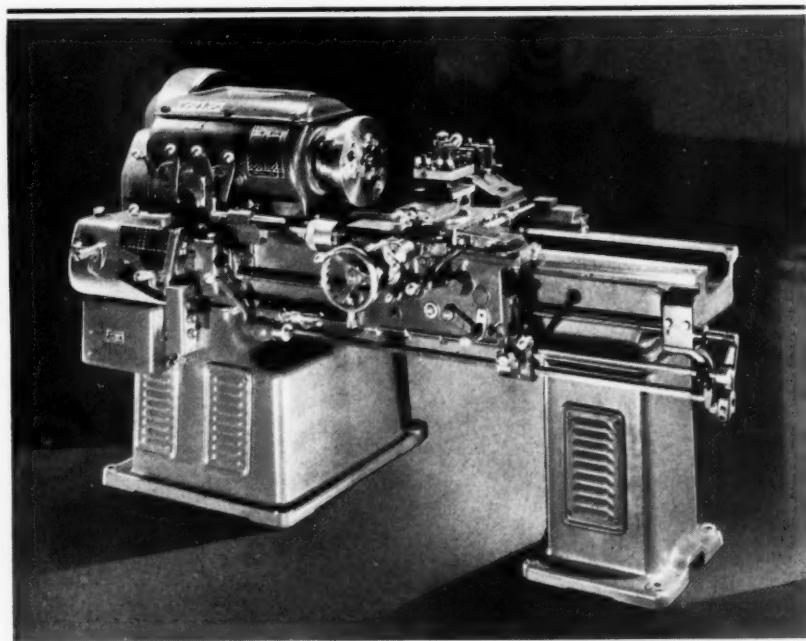
In previous machines, the mechanical element was required to separate the two unbalanced effects, as well as to support and rotate the rotor. In the present machine, this separation and also the unbalance indications are made by electrical means. This removal of the function of separation from the mechanical element allows the use of almost any mechanical set-up, permitting many balancing operations to be performed that heretofore would have been impracticable.

With the rotor rotating in the balancing machine, the only manipulation necessary is the operation of two electrical switches, giving direct readings of unbalance without the usual mechanical changes and without stopping the rotor. In addition, all errors due to vibration of the building are eliminated.—Booth No. E-304

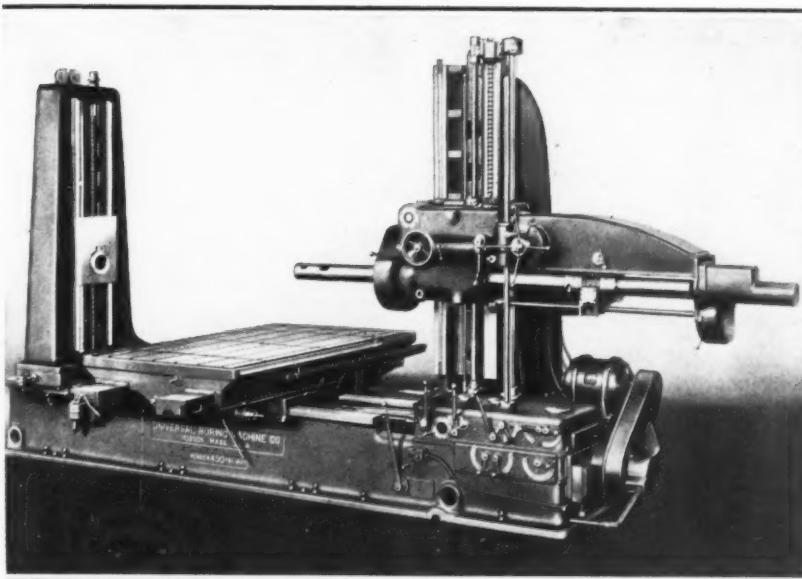
### *Monarch Engine Lathe Semi-Automatic Type*

**A**MONG the machines exhibited by the Monarch Machine Tool Co., Sidney, Ohio, will be a 14-inch, Model AA, sixteen-speed helical-gearied, Timkenized, semi-automatic engine lathe, equipped with a special chuck and tooling for the rapid machining of gear blanks. Spoked gear blanks of varying diameters can be chucked in such a manner as to prevent distortion. In this set-up, two tools on the rear connected tool-rest are set for facing both the hub and the rim simultaneously. Automatic cross-feed stop, automatic length-feed stop, and multiple carriage spacing stops provide the automatic features, enabling one operator to handle two machines placed facing each other, about as easily as he would operate one.

These machines can be quickly changed over from semi-automatic chucking work to either regular lathe work or multiple-tool turning and multiple-tool facing. The sixteen-speed headstock provides a wide range of spindle speeds, adapting the machines for operations with tungsten-carbide turning tools. Centralized oiling is provided for the quick-change gear-box, and the entire headstock mechanism is automatically lubricated. Automatic force-feed lubrication is provided for the bed ways, carriage, apron, and tool-slide.—Booth No. 813



*Monarch Semi-automatic Lathe Arranged for Machining Gear Blanks at Fast Production Rates*



*Universal Horizontal Boring Machine which is Designed for the Efficient Use of Cemented-carbide Tools*

### **New Type of Universal Horizontal Boring Machines**

THE new 400 series universal horizontal boring machines made by the Universal Boring Machine Co., Hudson, Mass., include a No. 440 machine with 4-inch diameter main spindle and a No. 450 machine with 5-inch diameter main spindle. The new series has been designed to meet the steadily increasing demand for faster and more powerful machines. A wide range of spindle speeds suitable for small drilling, milling, and boring operations and for the application of cemented-carbide tools can be provided for the main spindle if required.

The hardened, ground, and lapped Nitr alloy steel main spindle has a spindle sleeve mounted in Timken precision adjustable roller bearings. The front end of the spindle sleeve is equipped with a Nitr alloy steel bushing.

The table and saddle assembly, the outer support column, and the head column have been redesigned to provide greater rigidity. The machines are designed to take very large motors. Either size of machine may be equipped with a 20-horsepower motor for heavy-duty work.

On the No. 450 machine the traverse of the spindle with one resetting is 72 inches; the working surface of the table is 36 by 72 inches; and the power cross-feed of the table is 6 inches. There are twenty-four spindle speeds ranging from 8 to 300 revolutions per minute (slow speed

range), or from 7 to 850 revolutions per minute (high speed range). The weight of the machine is about 33,500 pounds.

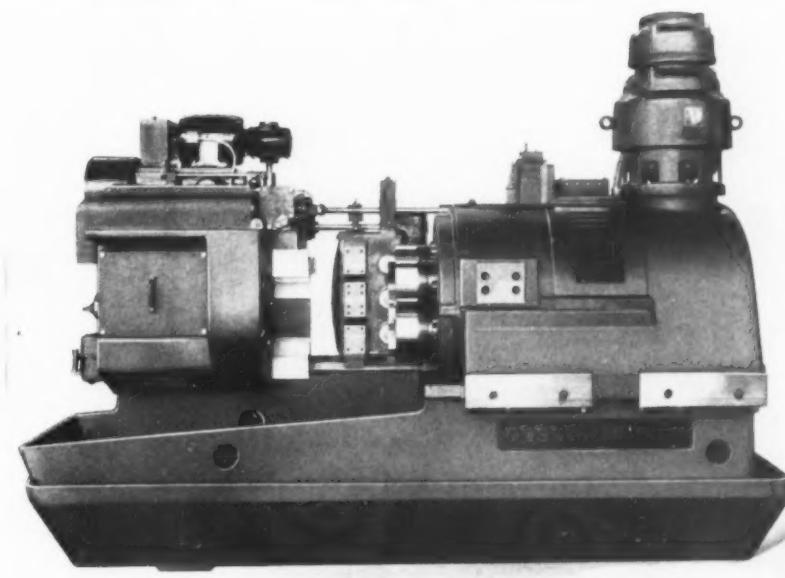
The No. 440 machine is of somewhat smaller dimensions all around. It may be equipped with either a slow speed range of 8 to 300 revolutions per minute or a high speed range of 8.3 to 1000 revolutions per minute.—Booth No. 304

### **Goss & De Leeuw Five-Spindle Machine**

A FIVE-SPINDLE chucking machine designed with a view to obtaining maximum production, accuracy, and economy will be exhibited by the Goss & De Leeuw Machine Co., New Britain, Conn. This machine contains important new features in chucking machine design, including direct-connected motors, a new spindle clutch construction, a new cross-slide construction, a built-in electrical control and electrically operated chucks.

A wide range of spindle speeds is available. The spindles are driven by a 10-, 15-, or 20-horsepower motor which runs intermittently, being controlled by an automatic switch operated by the forward and backward movement of the tool-slide. The spindle is started and stopped automatically while indexing to and from the loading position without noise or shock. Three heavy-duty cross-slides are provided in the second, third, and fourth spindle positions located at the rear of the machine. Each spindle is operated directly by cams.

Electrical chucking is provided by means of a reversing torque motor at the rear of each spindle. These motors are controlled by conveniently located push-buttons. The spindles have a maximum swing of 8 inches. The tool-slide has a travel of 6 3/4 inches; the cross-slide, 6 1/4 inches.—Booth No. 1008



*New Features in Chucking Machine Design are Presented in this Goss & De Leeuw Machine*

*Rockford "Hy-Draulic" Shaper  
and Shaper-Planer*

MANY improvements over earlier models have been made by the Rockford Machine Tool Co., 2499 Kishwaukee St., Rockford, Ill., in the "Hy-Draulic" shaper and shaper-planer to be shown at the Cleveland Exposition.

Referring specifically to the shaper, we note that the controls have been simplified for greater convenience and efficiency, and much of the piping and many fittings eliminated. A "free-flow" arrangement has been incorporated which obviates the surging of the oil in the circuit and eliminates excessive heating. The machine is provided with a new universal table having a hydraulic outboard support, synchronized with the hydraulic rail-lift. This outboard support prevents any possible sag of the table.

The "Hy-Draulic" shaper-planer exhibited will be a new model provided with newly developed Oil-gear equipment. Approximately 75 per cent of the former piping and couplings has been eliminated, thereby reducing the possibilities of leak-

age a proportionate amount. All important parts are easily accessible. The drive is by a direct-connected motor to the hydraulic unit, eliminating the former chain drive. Wherever pos-

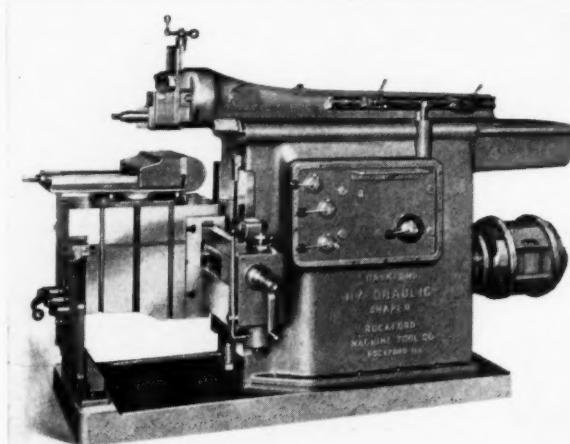


Fig. 1. Rockford Hy-Draulic Shaper with Simplified Control

sible, power-absorbing gears, bearings, links, and joints have been eliminated. These features increase the efficiency of the machine and materially reduce the maintenance expense.—Booth No. 310

*Cleereman Drilling and Tapping Machine*

HIGH-SPEED drilling, boring, and tapping machines built by the Cleereman Machine Tool Co., Green Bay, Wis., and distributed by the Bryant Machinery & Engineering Co., Chicago, Ill., are designed for the efficient application of high-speed tungsten- and tantalum-carbide cutting tools. They are built for heavy-duty, high-speed work, and have geared positive feeds. The gearing and anti-friction bearings are oiled by an automatic pressure oiling system. In the design of these machines, an effort was made to reduce gear backlash, excessive twisting of shafts, and deflection to a minimum.

The C 1 1/2 machine has a capacity for drilling 1 1/2-inch holes in SAE 1035 steel, and is made in 20-, 22-, 24-, and 28-inch sizes. The C2 machine illustrated will drill 2-inch holes in SAE 1035 steel, and is made in 24- and 28-inch sizes. The drill heads are so made that they are readily adapted for use as gang drills having any number of spindles up to six.—Booth No. 4-a

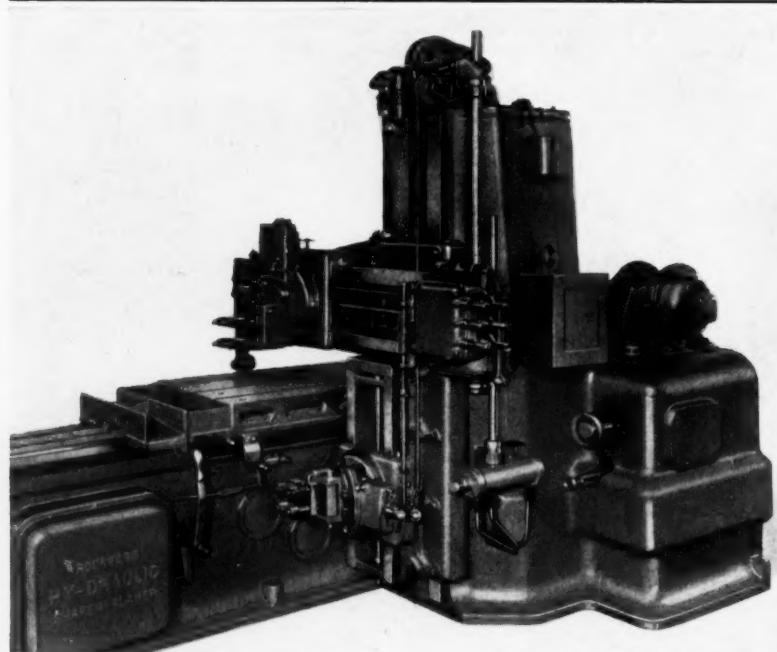
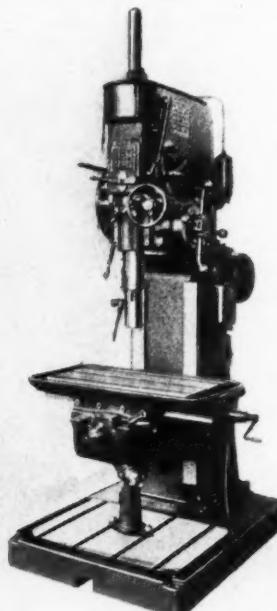


Fig. 2. New Oilgear Equipment on the Latest Rockford Shaper-Planer Eliminates 75 Per Cent of the Piping Formerly Required



Cleereman High-Speed Drilling, Boring, and Tapping Machine

## SOME OF THE MEN RESPONSIBLE FOR RESULTS IN THE MECHANICAL INDUSTRIES



G. C. POLK, Chief Engineer of the American Blower Corporation, Detroit, Mich.



J. J. CARTER, Assistant General Manager in Charge of Manufacturing, Olds Motor Works, Lansing, Mich.



WANTON M. GLADDING, Works Manager, Morse Twist Drill & Machine Co., New Bedford, Mass.



ARTHUR LANDIS, Vice-President in Charge of Production, Auburn Automobile Co., Auburn, Ind.



THOMAS J. CONNOR, Vice-President in Charge of Manufacture, Caterpillar Tractor Co., Peoria, Ill.



WILLIAM A. SCHMIDT, Chief Engineer, Remington Typewriter Company, Ilion, N. Y.



J. A. H. PHILLIPS, Superintendent and Plant Manager, Stephens-Adamson Mfg. Co., Aurora, Ill.



L. CLIFFORD GOAD, General Manager of Manufacturing, A C Spark Plug Co., Flint, Mich.



HARRY L. MILLER, General Manager, Traylor Engineering & Mfg. Co., Allentown, Pa.

## SOME OF THE MEN RESPONSIBLE FOR RESULTS IN THE MECHANICAL INDUSTRIES



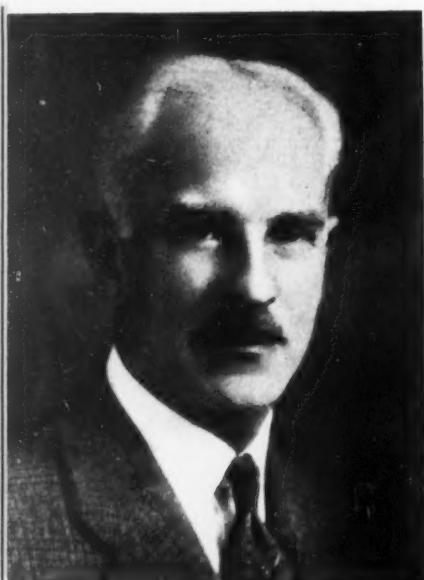
*M. C. INDAHL, Chief Mechanical Engineer, Lanston Monotype Machine Co., Philadelphia, Pa.*



*SIMON MACKAY, Vice-President and Works Manager, Union Twist Drill Co., Athol, Mass.*



*JOHN COX, Director of Manufacturing, Thompson Products, Incorporated, Cleveland, Ohio*



*W. E. BEST, Works Manager of the Addressograph-Multigraph Corporation, Cleveland, Ohio*



*R. H. AHLERS, Factory Manager, Delco Products Corporation, Dayton, Ohio*



*J. B. MILLS, Works Manager of the Ohmer Fare Register Company, Dayton, Ohio*



*HUGH DEAN, Assistant Manufacturing Manager, Chevrolet Motor Co., Detroit, Mich.*



*F. L. RUDDON, Factory Manager of the Federal Motor Truck Co., Detroit, Mich.*



*L. F. REMINGTON, Works Manager of the Thomson-National Press Co., Franklin, Mass.*

## Brown & Sharpe "Omniversal" and Plain Milling Machines

THE Brown & Sharpe Mfg. Co., Providence, R. I., has brought out two new milling machines—a No. 0 "Omniversal" and a No. 12 plain milling machine.

The "Omniversal" milling machine has been designed primarily for tool-room and experimental laboratory use, although it is also applicable to manufacturing work, especially when short runs would not justify fixture expense for obtaining accurate settings where several surfaces are to be milled. The machine surpasses the conventional universal milling machine in versatility. It provides an easy and accurate method of obtaining simple and compound angular settings for milling and boring. Frequently the work can be positioned for a number of operations without the need of relocating it in the holding device.

Angular settings of the table in both vertical and horizontal planes can be made accurately by means of verniers reading to 2 minutes of arc. This makes the machine especially suitable for operations on flat form tools, since clearance angles are easily obtained. The scope of the machine

is greatly widened by the use of a universal milling attachment which provides an auxiliary spindle that can be set at any angle in the horizontal and vertical planes. When not in use, this attachment remains at the side of the machine, from where it can be easily swung to the operating position at the front.

The capacity of the machine is as follows: Longitudinal feed: Table, 17 inches, automatic; knee saddle, 17 inches, automatic; combined longitudinal feed, table in horizontal position, 34 inches, automatic; transverse feed, 6 inches, hand; vertical feed, 10 3/8 inches, hand. Centers swing 10 inches in diameter and take work 14 1/2 inches in length.

The No. 12 plain milling machine represents a radical departure from present design, since it is operated through electrical controls rather than mechanical tripping. An automatic backlash eliminator makes it possible to rotate the cutters in the same direction as the feed (climb milling) or by the conventional method—against the direction of the feed. Two rates of cutting feed are available for any one selected feed rate, either one-half

the selected feed or double the selected feed. This feature is operated by a trip-dog which can be set at any desired point.

Four push-buttons control the electric functions of the machine, governing all table movements in either direction; automatic control is also provided through trip-dogs engaging switch contacts. The tripping mechanism will duplicate, in power fast travel, within less than 1/64 inch, and in cutting feed, within 0.002 inch. A jog push-button is provided for rotating the spindle when setting cutters. The table has a full automatic cycle, including power fast travel and cutting feeds in either direction. The machine is especially intended for the duplicate milling of medium-sized parts, either in moderate or long runs. The capacity of the machine is as follows: Automatic longitudinal table travel, 18 inches (can be made 24 inches as a special feature). Adjustment of spindle: Vertical, 7 1/2 inches; transverse, 3 1/4 inches. Speed range: 18 changes, 40 to 1050 revolutions per minute. Feed range: 16 changes, 1 inch to 35 inches per minute.—Booth No. 27

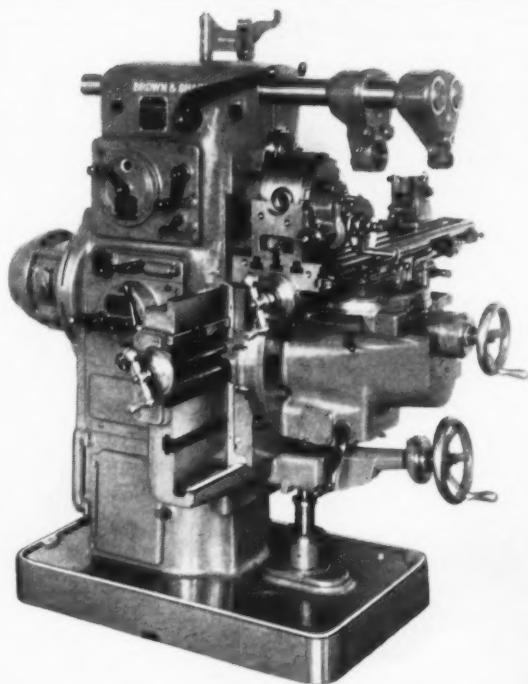


Fig. 1. The "Omniversal"—a Brown & Sharpe Universal Milling Machine of Increased Versatility



Fig. 2. A Plain Milling Machine Operated through Electrical Controls, Facilitating Duplicate Milling

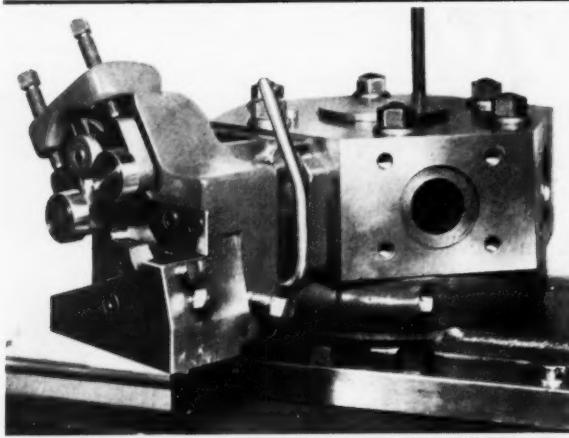


Fig. 1. Bar Turner Designed by the Warner & Swasey Co. for Heavy-duty Service

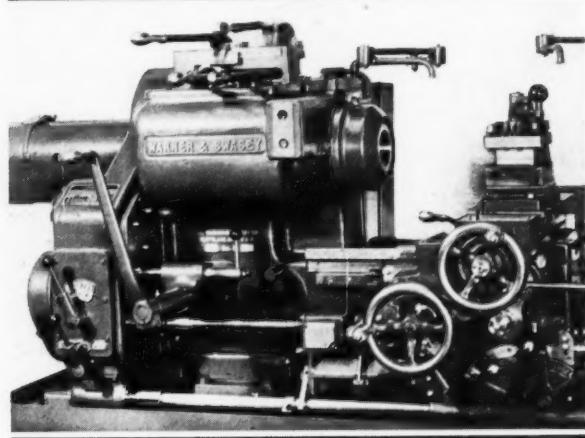


Fig. 2. Ram Type Turret Lathe Provided with the New Lead-screw Equipment

### Warner & Swasey Turret Lathe Improvements

A NEW No. 4-A universal turret lathe will be exhibited by the Warner & Swasey Co., 5701 Carnegie Ave., Cleveland, Ohio. This machine has been made heavier and more rugged throughout to meet the requirements of the new cutting tool practice. A new principle in the construction of the head is found in the arrangement of the shafts on which gears are mounted. All of these shafts are placed behind the spindle of the machine, some of them arranged one above the other on the rear side of the bed. With the shafts so arranged, a larger bar capacity—8 inches—is practicable, with a 9-inch capacity available if specially ordered.

The new cross-slide and its apron provide increased rigidity for carbide tools and for heavy-duty work in general. The new square turret mounted on the cross-slide has an internal circumference clamp ring. The index and clamp handle is located on top of the cross-slide to prevent interference with tools held in the hexagon turret. By employing shims in place of the conventional rockers underneath the cutters, carbide tools are adequately accommodated; the cutting angle of these tools is undisturbed when shims instead of rockers are used.

Automatic lubrication of the ways is provided by Bijur pumps, one of which is located in each apron and actuated by the travel of the respective slide. Whether the slide moves toward the spindle or away from it, the correct amount of lubricant is forced between the saddle and the ways.

Another improvement is found in

the direct-reading head shift. This indicator at the front of the head shows, by means of a white arrow, the speed of the spindle without reference to charts or symbols.

The Warner & Swasey Co. also will exhibit a new bar turner, Fig. 1, intended for heavy work with high-speed steel, Stellite, or carbide tools on turret lathes. The exhibit will include a new No. 3-A universal tur-

ret lathe, new heavy-duty chucking tools, a cutting speed pre-selector, and a new lead-screw for the ram type turret lathe. This is a solid lead-screw with no keyways or sleeves; the thread is permanently cut into the enlarged and otherwise unused portion of the left-hand end of the feed-shaft; there is a pick-off gearbox at the head end of the turret lathe, and an automatic longitudinal carriage stop for threading close to a shoulder. This arrangement is shown in Fig. 2.—Booth No. 905

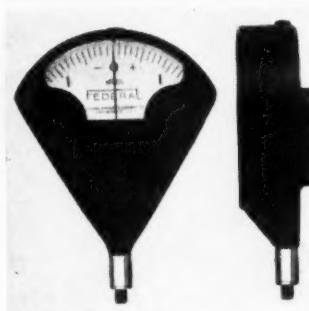
### Federal Clear-Vision Indicator

IN a Model 866 indicator to be included among the gages and indicators that will be shown by the Federal Products Corporation, 1144 Eddy St., Providence, R. I., only twelve 0.0001-inch graduations show in an opening in the indicator face. The dial has been designed to lead the eye directly to the point at which the reading is taken, and so the name "Clear Vision" has been applied to

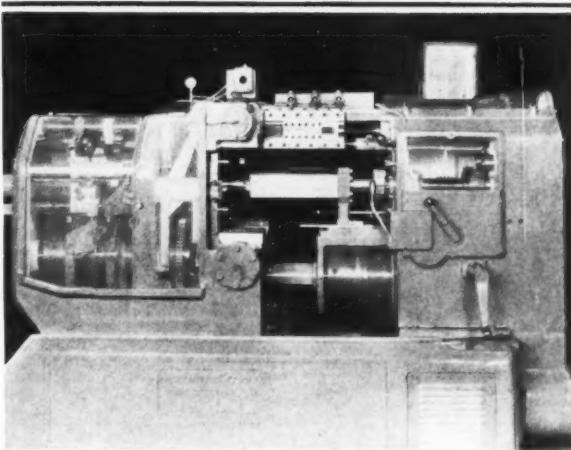
the indicator. The inspector can quickly spot the zero point and note the deviation of the needle. On the Model 866 indicator, which is illustrated, there is a space of 0.097 inch between the graduation lines. On a similar but larger indicator, known as Model 95, the graduation lines are 0.200 inch apart.

The company will also show a Model 110 comparator equipped with the Model 95 indicator. This comparator has an anvil mounted on an adjustable column. A Model 897 roller-type gage designed to be used by inexperienced operators in checking the pitch diameter of screw threads, will be an additional exhibit. Different sizes of rollers can be used in this gage to suit various sizes of screws.

The giant indicator built as a permanent exhibition in the Franklin Institute at Philadelphia will also be exhibited. This indicator is over 13 inches in diameter—the largest indicator of this type ever made.—Booth No. E-502



Federal Indicator with Easy-reading Feature



New Britain Automatic with Self-stopping and Warning Feature



Carbo Hydraulic Lathe—a Full-automatic "Cycle" Lathe

### New Britain Automatic with Novel Feature

A BAR type automatic screw machine that stops by itself whenever the stock in any spindle is too short to permit the machining of a complete piece of work, will be exhibited by the New Britain-Gridley Machine Co., New Britain, Conn. This stopping feature guards against tool breakage and avoids idle running of any spindle. The machine stops with all tools withdrawn and with the collet that requires stock open to receive a new bar.

This line of automatics is built in three models, Nos. 40, 41, and 60.

The features of these machines were described in August MACHINERY, and the No. 40 model was illustrated. The No. 41 model which is here shown, is built in several sizes, ranging from 1 3/8 by 6 inches up to and including 2 1/4 by 6 inches. The Model 40 is built in two sizes, namely, 7/8 inch by 5 inches and 1 inch by 5 inches. Both Models 40 and 41 are four-spindle machines. The Model 60 is of the six-spindle type and is also built in two sizes, 5/8 inch by 5 inches, and 1 inch by 5 inches.—Booth No. 909

### Porter-Cable Carbo Hydraulic Lathe

THE Carbo hydraulic lathe to be exhibited by the Porter-Cable Machine Co., Syracuse, N. Y., has been developed for use in the manufacture of duplicate parts of small and medium size. This machine is a full-automatic "cycle" lathe, which enables one operator to attend two or more machines, even though the operation is quickly performed. The automatic cycle consists of a rapid advance of the tools to the work, a slow feeding rate, and a rapid return to the loading position, provision being made for tool relief.

The Carbo hydraulic lathe embodies all the features of the present Carbo lathe, which was designed for the efficient utilization of the new high-speed alloy and tungsten-carbide tools, and in addition, provides smooth, even feeding movements by hydraulic operation, which insures long tool life. The accurate automatic setting of all tool-slides at the

beginning of each cycle enables parts to be duplicated within close limits.

An important feature is the hydraulic power feed to the cross-slide of the front carriage. Any one tool-slide can be operated independently of the others, or all slides can be operated simultaneously. Quick starting and stopping of the spindle and the elimination of manual operations

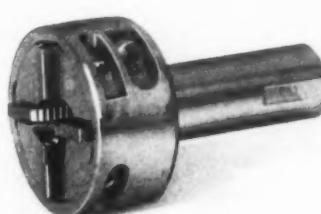
are features tending to increase production and reduce fatigue of the operator.

The hydraulic system is independent of the spindle drive and is operated by a separate motor. The spindle speeds range from 95 to 1130 revolutions per minute with the slow-speed head, and from 167 to 1978 revolutions per minute with the high-speed head and an 1800 revolution per minute motor. Other spindle speeds can be obtained by using slower speed motors.

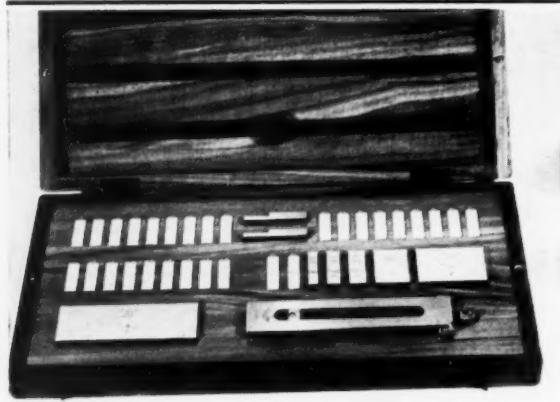
The distance between centers on this machine is 18 inches, the swing over the ways 14 inches, and the swing over the carriage, 7 inches. Any desired feed from 0 to 24 inches per minute is obtainable. The rapid return movement is at the rate of 15 feet a minute and can be reduced to 3 feet a minute.—Booth No. 307-c

### H & G Die-Head with Insert Chasers

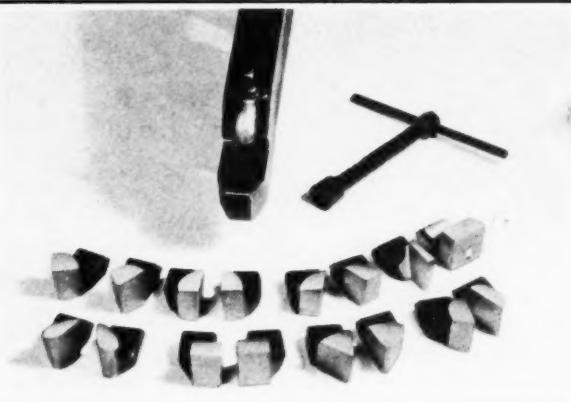
A NEW product brought out by the Eastern Machine Screw Corporation, New Haven, Conn., consists of a solid adjustable die-head equipped with the company's insert chasers. The object of the new die-head is to make it possible for manufacturers who are accustomed to using solid dies to obtain the advantages of the insert chasers. These die-heads are provided with the same insert chasers as are used in the regular line of insert-chaser self-opening die-heads made by the company. The solid die-heads, however, have only about one-fourth the weight of corresponding self-opening die-heads.—Booth No. 900



Solid Adjustable Die-head with Insert Chasers



New Set of Johansson Gage-blocks and Accessories



O. K. Shankless Bits and Holders for Lathes, Shapers, and Planers

### Ford Exhibits New Johansson Gage Set

A NEW No. 2 set of Johansson gage-blocks and accessories will be exhibited by the Johansson Division of the Ford Motor Co., Dearborn, Mich. This set contains thirty-five gage-blocks and three accessories. It can be used to set up amplifiers, visual gages, comparators, and mechanical gages. The blocks can be used to check snap gages, plug gages, inspection and production gages,

micrometers, inside and outside measurements, and leads of screw threads, all within 0.0001 inch. They are also used in scribing lines and spacing holes.

Many Johansson products identical to those exhibited at the World's Fairs in Chicago and San Diego will also be shown. A projection machine will show these gages in use.—Booth No. A-201

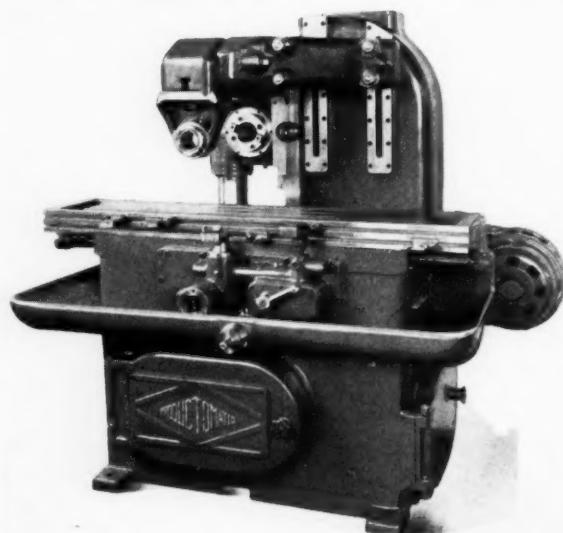
### Producto-Matic for a Wide Range of Work

A MANUFACTURING type of machine for performing miscellaneous milling operations on a wide variety of medium-sized work will be introduced at the Show by the Producto Machine Co., Bridgeport, Conn. This machine is supported by a cabinet base which encloses the feed and speed transmission.

The length of the work-table is such as to permit long cuts, and the table is supported for practically its entire length of travel. A quick-traverse mechanism returns the table at a speed of 300 inches per minute. Table feeds of from 7/8 inch to 12 1/2 inches per minute are available.

The cutter-spindle bearing is adjustable vertically on the face of the column for locating the cutters to suit different classes of work. The cutter-spindle is driven by worm-gearing close to the spindle nose. The table has a working surface 43 1/2

inches long. The over-all length of the table is 53 1/2 inches, and the over-all width, 11 inches.—Booth No. 307-A



Producto-Matic Milling Machine Designed for Easy Adaptation to a Large Variety of Work

### Adjustable Shankless Bits and Tool-Holders

A LINE of shankless bits and holders for lathe, shaper, and planer work, which have features similar to those of the serrated-blade milling cutter made by the O. K. Tool Co., Inc., Shelton, Conn., will be introduced at the Show by the same concern. The tool bits are of drop-forged and heat-treated high-speed steel, and the holders are made of a chromium-nickel alloy, drop-forged and heat-treated.

These tools are so designed that the tightening of the locking clamp forces the tool bit rearward, locking it against the angular mating surface of the holder and at the same time, exerting downward pressure. This downward pressure causes an interlocking of the angular serrated surfaces of the bit and of the holder.

This method of holding the tool bit eliminates any sidewise or lengthwise tipping that may be caused by the cutting action, thus relieving the locking clamp from practically all strain. By loosening the clamp, the bit can be adjusted laterally to compensate for stock removed in grinding or to make the tool conform with the work. All O. K. tool bits are so formed, however, that it is seldom necessary to grind more than the top surface. Thirteen different types of tool bits are made for these holders. The planer tools are available with double-end holders and in single-end goose-neck types.—Booth No. A-313

## SOME OF THE MEN RESPONSIBLE FOR RESULTS IN THE MECHANICAL INDUSTRIES



*HAROLD S. FALK, Vice-President  
and Works Manager, Falk Corporation,  
Milwaukee, Wis.*



*GEORGE F. THOMAS, Factory Super-  
intendent, Stewart-Warner Corporation,  
Chicago, Ill.*



*CHARLES EISLER, President and  
Treasurer, Eisler Engineering Company,  
Newark, N. J.*



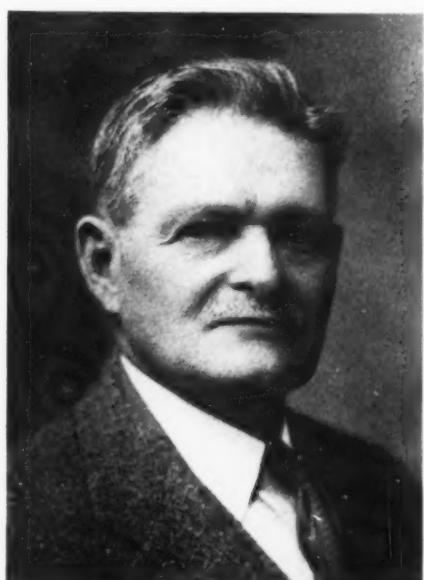
*V. W. PETERSON, President of the  
Hannifin Manufacturing Company,  
Chicago, Ill.*



*W. H. PATTERSON, Chief Engineer,  
Thomas A. Edison, Inc., West Orange,  
New Jersey*



*HUGH BENET, Manager, Harrison  
Works, Worthington Pump & Machin-  
ery Corporation, Harrison, N. J.*



*JOHN H. GARDEN, Mechanical En-  
gineer, Hartford (Conn.) Works,  
Underwood Elliott Fisher Co.*



*GEORGE E. TURNER, General Super-  
intendent, Marion Steam Shovel Co.,  
Marion, Ohio*

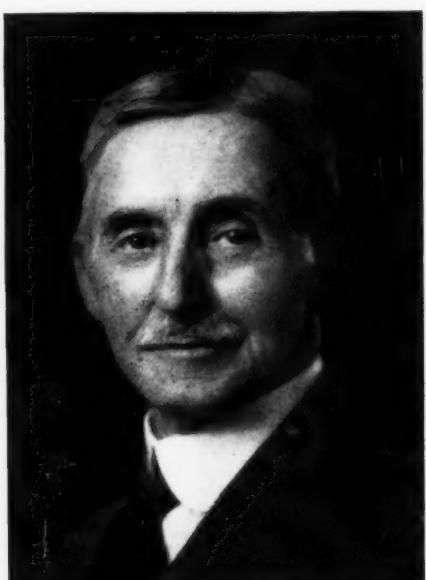


*J. P. HENRY, General Superintendent,  
National Transit Pump & Machine Co.,  
Oil City, Pa.*

## SOME OF THE MEN RESPONSIBLE FOR RESULTS IN THE MECHANICAL INDUSTRIES



*R. A. NORLING, Chief of Engineering and Design, Independent Pneumatic Tool Co., Chicago, Ill.*



*W. S. DAVENPORT, President and General Manager, Davenport Machine Tool Co., Rochester, N. Y.*



*W. E. SYKES, Consulting Engineer of the Farrel Birmingham Company, Buffalo, N. Y.*



*J. A. V. TURCK, Chief Engineer of the Felt & Tarrant Mfg. Company, Chicago, Ill.*



*W. S. OSWALD, Superintendent of the Nuttall Plant, Westinghouse Electric & Mfg. Co., Pittsburgh, Pa.*



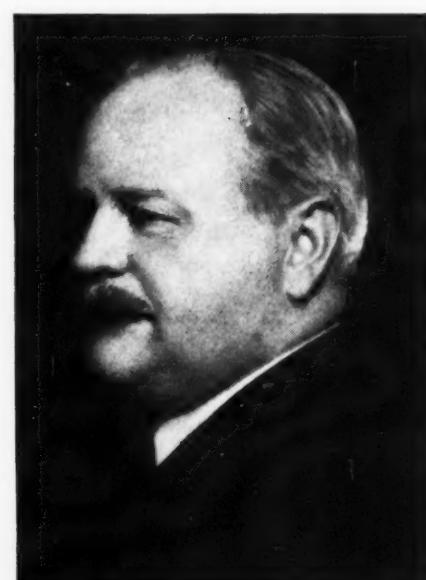
*J. A. SMITH, President of United States Electrical Tool Co., Cincinnati, Ohio*



*FISKE R. JONES, Superintendent of the Simonds Saw & Steel Company, Fitchburg, Mass.*



*C. F. SMITH, General Factory Manager, American-LaFrance & Foamite Industries, Inc., Elmira, N. Y.*



*H. A. SCHATZ, President and Superintendent, Federal Bearings Co., Inc., Poughkeepsie, N. Y.*

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## Lo-Swing and Speedcut Lathes and Star Centering Machines

AMONG the new machines to be exhibited by the Seneca Falls Machine Co., Seneca Falls, N. Y., are a "Lo-Swing" Model U automatic lathe, a Lo-Swing Unitlathe, a Lo-Swing Imp, a Speedcut lathe, and a Star production drilling and centering machine.

The Lo-Swing Model U automatic lathe is designed to accommodate a wide variety of work. It is particularly adapted for turning pistons, bushings, stem pinions, steering knuckles, and other short cylindrical work. Either straight turning or forming, or a combination of both, can be performed. It can be arranged for machining simple jobs coming through in small lots or for handling jobs on a high-production basis. The cost of changing over is small.

The machine is completely automatic in its operation. The operator merely places the work in the machine and starts it by manipulating a single lever. The machine completes the cycle and stops with the carriage slides returned to the starting position. It is equipped with individual motor drive, the motor being mounted in the base. Two sizes are built—12 inches and 36 inches between centers—each size having a 5-inch swing.

The Lo-Swing Unitlathe is quite an innovation in turning machine de-

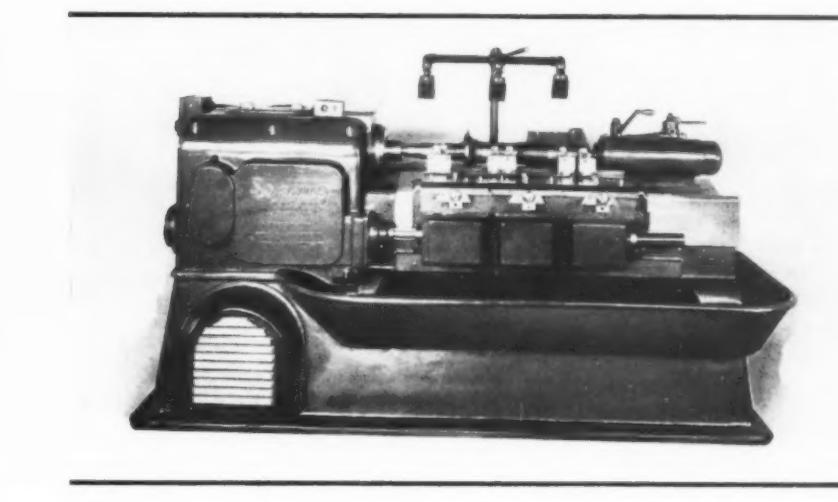


Fig. 1. Lo-Swing Model U Automatic Lathe, Adapted for Turning Pistons, Bushings, Stem Pinions, Steering Knuckles, and Similar Work

sign, being built entirely on the unit principle. A base machine consisting of an integrally cast bed and headstock is mounted on a cabinet base which houses the motor, coolant tank, and pump, and which forms the chip pan. Standardized and interchangeable units assembled to this base machine, either when originally built or later, as required, provide a lathe specifically suited to the work in hand. Thus a machine arranged for plain turning can be easily con-

verted into any other type of turning machine, including a full automatic.

The design is such that each unit becomes an actual part of the complete machine design, providing the appearance and efficiency of a specially designed single-purpose machine.

The Lo-Swing Imp has been designed to meet the requirements for a small accurate lathe, heavy enough for high spindle speeds. It is intended to handle work that is too small for



Fig. 2. Lo-Swing Unitlathe, Built Entirely on the Unit Principle, which Can be Easily Converted from One Type of Single-purpose Machine to Another

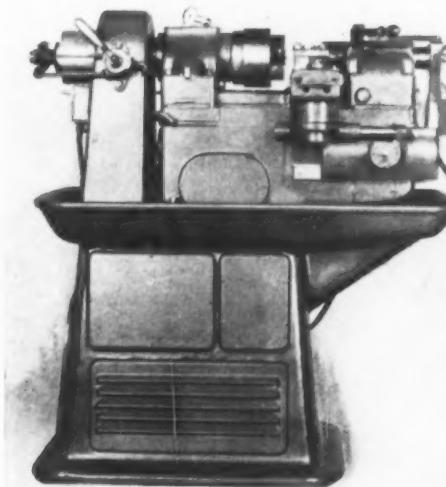


Fig. 3. The Seneca Falls Lo-Swing Imp, Designed to Handle Work that is too Small for Heavier Automatics

## THE CLEVELAND EXPOSITION

heavier automatic lathes. This machine is particularly suitable for bushings, pistons, valves, bearings, and similar small parts. It is suited to a wide range of tooling and can be adapted to either chucking or center work. It is capable of spindle speeds up to 5000 revolutions per minute. Both the spindle and the feed mechanism are direct-driven through V-belts, there being no gears.

The Speedcut machine has been designed particularly for single-point turning or modified multiple-tool turning, and is capable of taking full advantage of carbide cutting tools. Spindle speeds up to 3600 revolutions per minute are available. Three quick changes of feed and pick-off gears provide a range of from 0.001 to 0.060 inch per revolution of the spindle.

The machine is available with or without rapid traverse to the carriage, and also with automatic rapid traverse. When the machine is furnished without rapid traverse, the carriage is moved to the cutting position and returned by means of a handwheel. On the plain rapid-traverse machine this action is manually controlled by a lever at the right of the apron. Machines with automatic rapid traverse are started by lifting this lever to its highest position. This throws in the rapid traverse forward. When the tool reaches the work, the rapid traverse is thrown out and the regular feed automatically thrown in. At the end of the cut, the tools are automatically withdrawn and the carriage returned to the starting point. The lathe swings 18 inches over the ways and weighs approximately 6000 pounds.

The Star drilling and centering

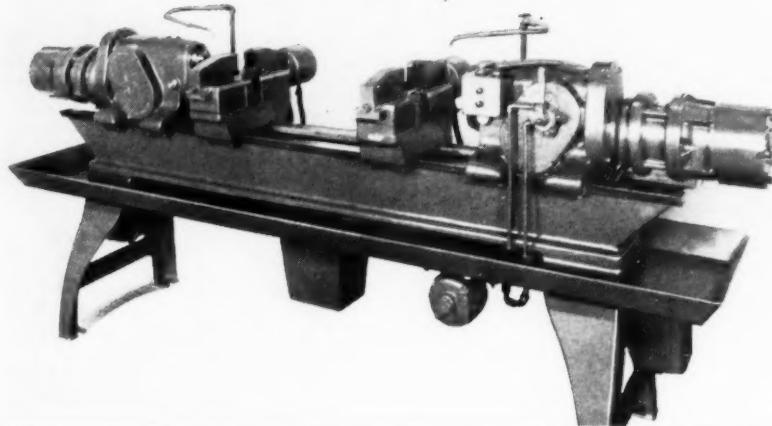


Fig. 4. Star Drilling and Centering Machine for Centering Work on a Production Basis

machine has been designed for centering work on a production basis; yet the machine is flexible enough for economical changeover, when necessary. The machine has two motor-driven independent heads, each with its own cycle and independent speeds and feeds, but arranged to operate in timed relation to each other.

The standard cycle provides for rapid approach, feed, withdrawal

near end of stroke to clear chips, and a slow final feed. Variations in this cycle are possible, so that one end of the shaft can be drilled, centered, and counterbored while the other end is being centered.

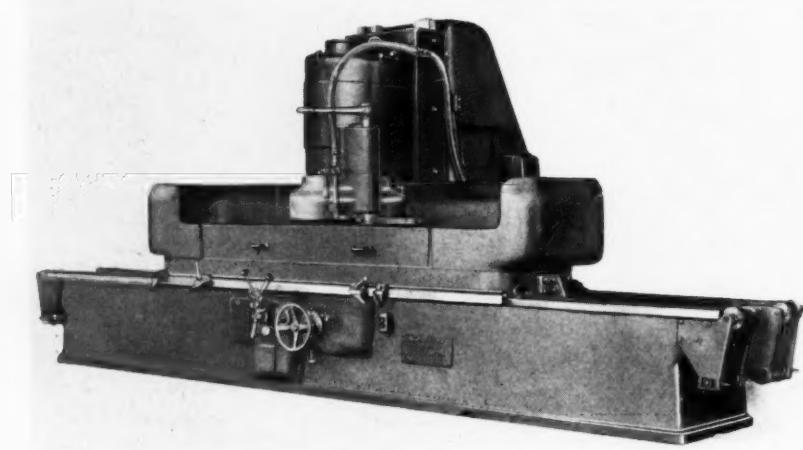
The company will also exhibit an improved automatic work-driver designed along lines similar to the work-drivers regularly made by the company and previously described in MACHINERY.—Booth No. 914

### Hanchett Vertical-Spindle Surface or Face Grinder

A No. 400 series vertical-spindle surface or face grinder occupying a floor space 29 feet long by 9 feet wide and weighing 21,000 pounds has been brought out by the Hanchett Mfg. Co., Big Rapids, Mich.

The work-table of this machine is hydraulically operated and has speeds ranging from 0 to 90 feet per minute. The finished top of the work-table is 18 inches wide by 86 inches long and has four T-slots in it. The box type bed has one flat way and one V-shaped way, each 4 inches wide and of such length that the work-table never overhangs at the extreme end of the stroke in either direction. The vertical spindle is mounted in precision ball bearings, 4 inches in diameter at the bottom and 3 inches at the top, and is driven by a built-in type, 30-horsepower motor.

Cylinder or segmental type grinding wheels up to 22 inches in diameter may be used. Both hand and automatic feeds are available for the grinding wheel and there is a separate power unit for raising and lowering the wheel-head. A pressure lubricating system is provided for the table ways, and there is a separate force-feed lubricating system for the spindle bearing. The lubricating system has a built-in Purolator.—Booth No. 6



Huge Hydraulically Operated Surface Grinder to be Exhibited by the Hanchett Mfg. Co.

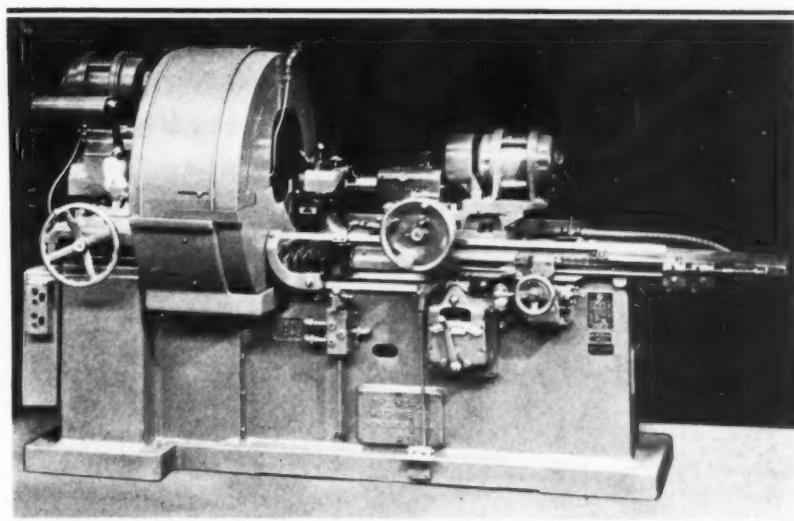


Fig. 1. Heald Internal Grinder Designed for Handling Work up to 38 Inches in Diameter

### Heald Internal Grinding Machines for a Large Variety of Work

A GAP type of internal grinder designed particularly for finishing medium-size holes in gears, plates, connecting-rods, housings, and similar parts of large swing has recently been developed by the Heald Machine Co., Worcester, Mass. By providing a heavy T-head base and a low work-center, a conveniently operated machine of unusual rigidity has been made available for work-pieces that are usually awkward to handle. Work up to 38 inches in diameter by 15 inches long can be handled. The grinding stroke is 7 1/2 inches.

The hydraulic drive provided for the table gives any desired speed. The work guard is opened and closed by a hydraulic cylinder and piston located at the rear of the machine and controlled by a valve within easy reach of the operator. The work guard swings completely back out of the way to permit loading with an overhead crane. A quick-acting truing device is part of the regular equipment. The operating units and drives are similar to those of the regular No. 72A internal grinder built by the company.

Holes up to 20 inches in diameter can be ground by the No. 74 internal grinding machine shown in Fig. 2, which is intended primarily for handling large heavy work of all kinds. While the construction is similar to that of the No. 72 machines, the units of the No. 74 grinder have been designed for larger capacity and are proportioned accordingly.

The base is T-shaped to provide

a large amount of support for the work-head. The table is hydraulically operated, so that an unlimited number of speeds are obtainable between the minimum and maximum. The lower part of the base is an enclosed reservoir for the oil supply. The rear-shaft motor, which is directly coupled to the oil and coolant pumps, is mounted on vibration dampeners. Switches for all motors are in the terminal box at the front of the base. The swing over the table of this machine is 14 inches, while the swing inside the standard water guard is 26 inches. The weight of the machine is about 12,000 pounds net.—Booth No. 206

### Harnischfeger Heavy-Duty Arc Welders

A LINE of heavy-duty arc welders to be introduced at the Show by the Harnischfeger Corporation, Milwaukee, Wis., will incorporate a number of important changes over past models. The refinements include an over-size, two-bearing armature shaft; removable ball-bearing capsules; a more simplified, single-current control; a dustproof calibration plate; a heavy-duty built-in polarity switch; and drip-proof housings.

The line includes 200-, 300-, and 400-ampere units, which retain the previous P & H Hansen generator design. The motors have solid cast frames with a top opening for the terminal leads and for mounting a magnetic switch type starter. Air is constantly circulated by a large aluminum fan between the motor and the generator, and is discharged at the end of the all-welded generator housing.—Booth No. E-504

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**Any effort to prevent the application of better machinery and more efficient methods in manufacturing plants, or to reduce production or unduly limit hours, is a direct effort to increase the cost of living and reduce the living standard.**

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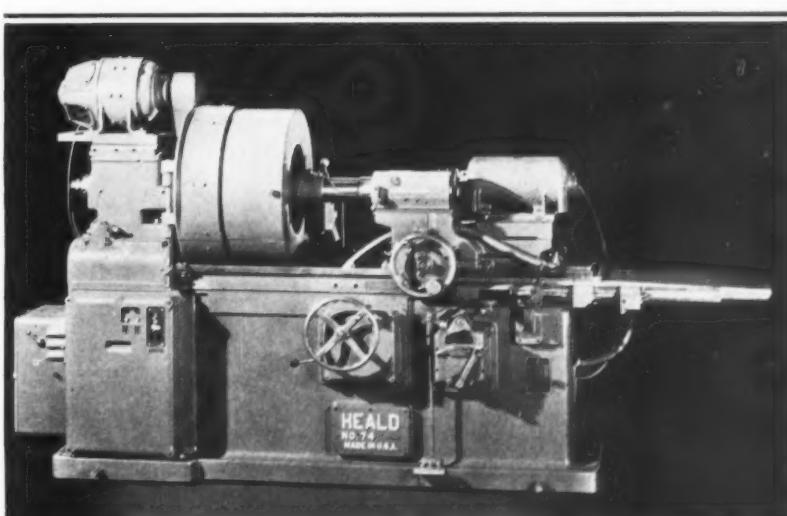
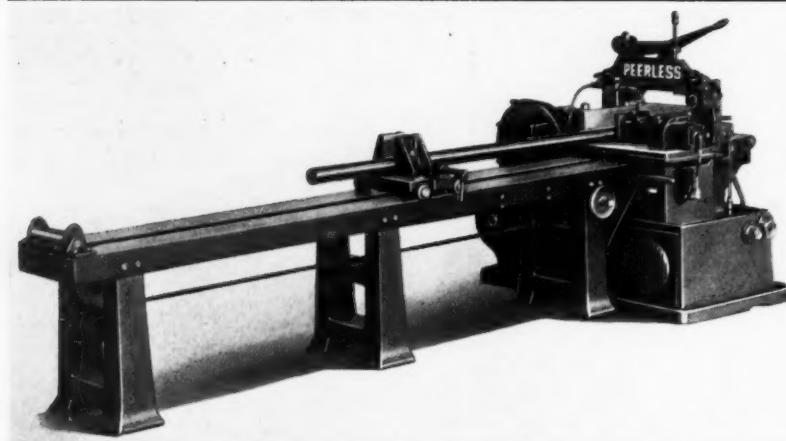


Fig. 2. Machine Intended for Grinding Holes up to 20 Inches in Diameter in Large Heavy Parts



*Peerless Power Hacksawing Machine Equipped with Hydraulically Operated Automatic Bar Feed and Conveyor*

### *Peerless High-Duty Metal Sawing Machine*

**A** 6 1/2- by 6 1/2-inch improved high-duty metal sawing machine has been brought out by the Peerless Machine Co., Racine, Wis. This new machine is designed for exceptionally fast and accurate sawing of all kinds of metal, and can be furnished with or without hydraulically operated automatic bar feed with conveyor.

The machine is equipped with an enclosed three-speed sliding transmission providing approximately 60, 100, and 145 strokes per minute. It can be arranged for either V-belt motor drive or regular belt drive. On the motor-driven machine, the V-belt drive and motor are enclosed within

the base of the machine. The machine is operated by a push-button control. The blade capacity is from 10 to 14 inches. Accuracy is insured by the construction of the saw frame—a patented feature—with its four horizontal bearings, and the saw frame guide with four vertical bearings entirely surrounding the saw blade.

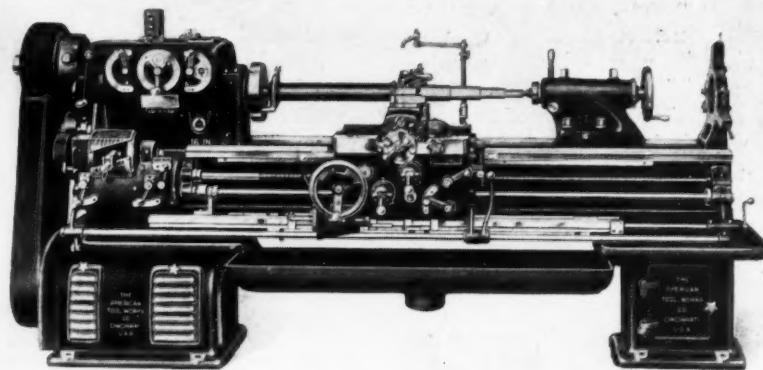
The automatic bar feeding equipment is hydraulically operated. It automatically opens the vise, feeds the stock forward to a gage, closes the vise, and continues to repeat the complete cycle of cutting until the entire bar is used up.—Booth No. 901

### *American Multi-Production Lathe*

**A** MULTI-PRODUCTION lathe has been developed by the American Tool Works Co., Cincinnati, Ohio, for the express purpose of filling the gap between the standard engine lathe and the highly specialized single-purpose automatic lathe. This lathe combines the adaptability and range of the engine lathe with the production features of single-purpose machines. It is provided with the required power, high speed, and rigidity required for the effective use of the new cutting alloys. Recently installed machines in several well-known plants have increased production as much as five times. The principal features are briefly enumerated in the following.

To provide for automatically stopping the carriage feed at predetermined points along the work, an accurate and positive, quick-setting

automatic longitudinal stop mechanism is supplied. For quickly and accurately locating the stop-dogs that



*American Multi-Production Lathe Combining the Advantages of the Engine Lathe and the Single-purpose Machine*

actuate this mechanism, a large rust-proof scale is slidably mounted in the front face of the outer bed-way. Hand-operated, positive diameter stops of the barrel type provide for five work diameters and carry adjustable stop-dogs for both front and rear cutting tools.

The setting of the cross-feed stops is facilitated and work diameters can be quickly and accurately determined when the cross-feed stops are not in use by patented dual cross-feed dials, which read directly in terms of work diameters. One dial is graduated in fractions, and the other in thousandths of an inch.

To provide for the high work speed used in connection with cemented-carbide cutting tools, a live, roller-bearing mounted tailstock center is furnished. The operator is protected from flying chips when turning at high speeds by a patented chip breaker and controller, attached to the cutting tool. The 20-inch multi-production lathe is driven by a 20-horsepower motor.—Booth No. 901

***Non-machinery-using nations are the poorest in the world; and their people have to work the hardest to gain a mere subsistence. The difference between the standard of living in this country and in China is measured by the difference in the use of efficient machinery in the two countries.***

## SOME OF THE MEN RESPONSIBLE FOR RESULTS IN THE MECHANICAL INDUSTRIES



J. G. RAVNIK, Vice-Pres., in Charge of Manufacturing and Engineering, Johnson Motor Co., Waukegan, Ill.



RALPH S. HOWE, Vice President, New Britain-Gridley Machine Co., New Britain, Conn.



A. R. RICHARDSON, General Factory Superintendent, Pomona Pump Co., Pomona, Calif.



ELLIS GEORGE MALPAS, Works Manager of the Sealed Power Corp., Muskegon, Mich.



J. A. FIX, Charge of Plant Operations, Oliver Farm Equipment Co., South Bend, Battle Creek, and Springfield



CARL W. MODIG, Factory Superintendent, Indian Motorcycle Company, Springfield, Mass.



GEORGE R. BOTT, Engineering Manager, Norma Hoffmann Bearings Corporation, Stamford, Conn.



PERCY E. STRINGER, General Superintendent, Elgin National Watch Co., Elgin, Ill.



ARTHUR SCOTT, General Plant Superintendent, Cleveland Pneumatic Tool Co., Cleveland, Ohio

## SOME OF THE MEN RESPONSIBLE FOR RESULTS IN THE MECHANICAL INDUSTRIES



*J. J. DEWEY, General Factory Manager, American Laundry Machinery Co., Cincinnati, Ohio*



*GEORGE A. STROMPL, Factory Superintendent, Douglas Aircraft Co., Inc., Santa Monica, Calif.*



*W. H. SWINK, Production Manager of the Lycoming Mfg. Company, Williamsport, Pa.*



*RICHARD A. NORTH, Chief Engineer of Farrel-Birmingham Company, Ansonia, Conn.*



*HARRY G. ROBINSON, Chief Engineer, Andrew C. Campbell Div., American Chain Co., Inc., Bridgeport, Conn.*



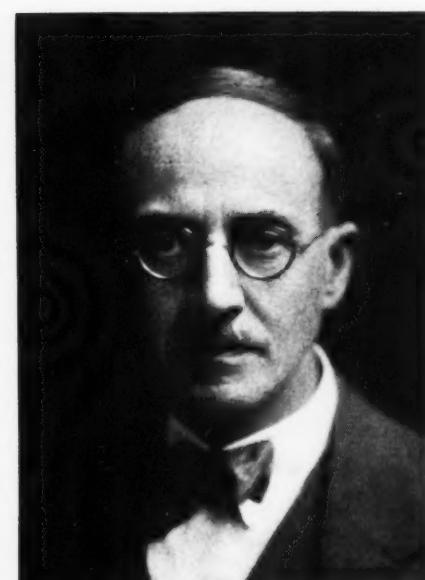
*F. C. ERNST, Chief Engineer, in Charge of Design and Manufacture, Jenkins Bros., Bridgeport, Conn.*



*HASKELL CARTER, Production Manager of the Iron Fireman Mfg. Co., Portland, Oregon*



*H. R. FREUND, Chief Engineer of the Intertype Corporation, Brooklyn, New York*



*HARRY SLOAN, Advisory Engineer of the Vilter Manufacturing Company, Milwaukee, Wis.*

## SOME OF THE MEN RESPONSIBLE FOR RESULTS IN THE MECHANICAL INDUSTRIES



*R. M. RUMBEL, Manager, Meter Division Westinghouse Electric & Mfg. Co., Newark, N. J.*



*N. W. KISSEN, Plant Superintendent of the Reed Roller Bit Co., Houston, Texas*



*M. J. ANDERSON, Chief Engineer of the Mathews Conveyor Company, Ellwood City, Pa.*

### *Hall Single-Head Pipe Threading Machine*

**A** PIPE-THREADING machine which will mill pipe threads  $3 \frac{3}{8}$  inches long with both the lead and taper accurate over the whole length of thread within 0.0005 inch will be exhibited at the Show by the Hall Planetary Co., Fox St. and Abbotsford Ave., Philadelphia, Pa. This machine will thread pipe from 2 to 18 inches in diameter. Machines of

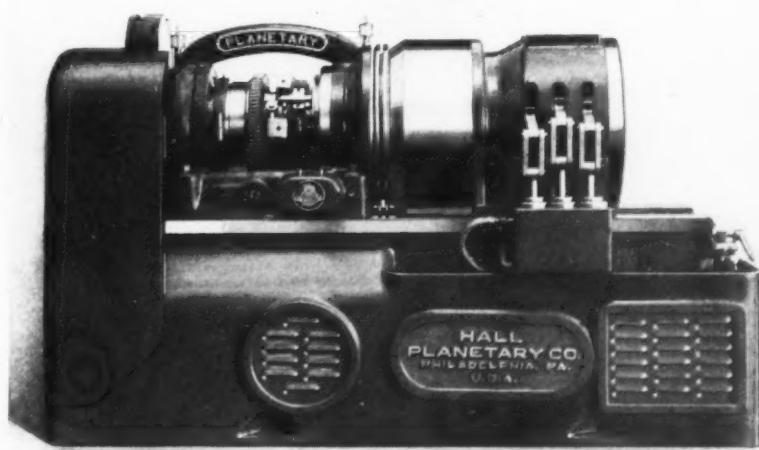
this model were built for one of the large steel mills for accurate pipe-threading work requiring smooth, clean-cut threads with the lead accurate at all points.

One of the unusual features of design is that the cutter-head is mounted on the spindle and can be quickly replaced, although it weighs about 500 pounds, with the assurance that it will always run true with the

spindle. The cutters are of the patented button type, with the thread form on the cutter buttons ground to the correct angle and form, and with the lead within 0.0005 inch in the length of the cutter, which is  $3 \frac{3}{8}$  inches. These cutters leave no chatter marks.

Another important feature is the chuck for holding the pipe. This chuck weighs four tons and is so designed that it holds the pipe without distorting or changing the form or shape of the pipe. Thus, if the pipe is slightly out of round, it retains its imperfect form when held in the chuck, so that the thread will be round when the pipe is removed from the machine. The chuck is hydraulically operated, the motor for driving the hydraulic pump and the valves being mounted in the right-hand end of the machine bed. The motor that drives the spindles is mounted directly under the planetary head.

The cutting compound is supplied by a centrifugal pump which pumps 100 gallons of cutting oil per minute on the thread milling cutter. The cutter and the end of the pipe being threaded are both completely covered by the large steel ring forging between the planetary head and the chuck.—Booth No. 14



*Hall Pipe Threading Machine Designed for Accuracy and Quiet Running*

*Van Norman Exhibits New Line of Milling Machines*

FOUR sizes of a new line of milling machines will be exhibited by the Van Norman Machine Tool Co., Springfield, Mass. All four of the new machines employ the swiveling cutter-head that has always been typical of the Van Norman design. Important features have been incorporated in the machines to fit them for high-speed operation.

The new line includes the No. 6 machine with hand feeds especially intended for work on small tools and dies, and for experimental shops; and the No. 12, of larger proportions, intended for tool-rooms, pattern shops, experimental shops, and short-run production operations. These two machines have been described previously in *MACHINERY*.

The No. 22 and the No. 32 machines that complete the line are similar in design, except for size and capacity. The No. 22 machine has a table power feed of 27 1/2 inches and a vertical power feed of 17 1/2 inches; while the No. 32 machine has a table power feed of 37 1/2 inches and a vertical power feed of 23 1/2 inches. The cross power feed is the same on both machines—10 3/4 inches.

The No. 32 machine shown in the illustration is the largest and most

flexible in the line of Van Norman milling machines. It has a greater range than the other machines for large patterns, dies, jigs, and fixtures, and is suitable not only for tool-room work, but also for short-run production milling. It has anti-friction bearing construction throughout. Like

the other machines in the line, it is capable of milling vertical, horizontal, and angular surfaces throughout the entire run of the table without complicated blocking and with the use of standard right-angled cutters. Attachments are provided that adapt this, as well as the other machines, for boring, slotting, high-speed routing, and profiling. The two larger models, in addition, have attachments for drilling, and cutting spirals, without a change in set-up.—Booth No. 913

*Bausch & Lomb Contour Measuring Projectors*

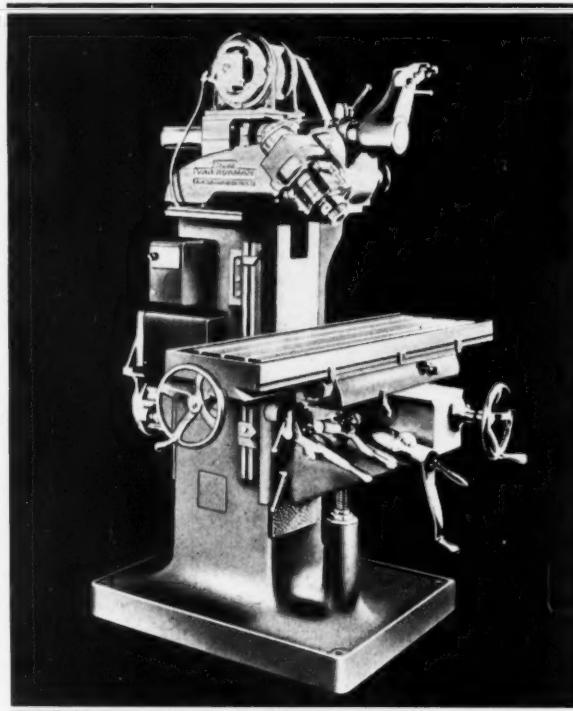
THE Bausch & Lomb Optical Co., Rochester, N. Y., will exhibit two new contour measuring projectors for inspection purposes in the mechanical industries. The larger of the two instruments is illustrated.

Some of the new features common to both projectors are: A light source consisting of an incandescent lamp with practically unlimited life; an optical system providing images free from distortion, with magnification accurately rated on the lens system; a horizontal table which eliminates the need of many fixtures for holding specimens; and the adaptability of the instruments for either visual or photographic work without the requirement of a dark room.

The small projector is provided

with a vertical translucent screen upon which the outline of an object may be traced, and an opaque horizontal screen formed by a small retractable drawing board, upon which paper or original drawings can be attached. The image can be instantly changed from one screen to another. The translucent screen may be replaced by a photographic plate or by a pair of plate glasses mounted in a book-form frame, between which original tracings may be placed.

Several types of screens are also provided with the large projector. The work-table for the large instrument is horizontal. This table moves vertically for focussing or for accommodating objects of varying thickness.—Booth No. A-309



*The Largest and Most Flexible Machine in the New Line of Van Norman Millers*



*Bausch & Lomb Contour Measuring Projector with a New Optical System*

### Hannifin "Hi-Power" Portable Hydraulic Riveter

**L**IIGHT weight, speed of operation, and large capacity are the outstanding features of an entirely new type of hydraulic production riveting machine to be exhibited by the Hannifin Mfg. Co., 621-631 S. Kolmar Ave., Chicago, Ill. This machine consists of a portable yoke type hydraulic press connected by high-pressure hose and electric control cable with an automatic hydraulic pressure generator.

The portable yoke press, which is shown at the left in the accompanying illustration, weighs only 54 pounds and yet develops a maximum pressure of 35,000 pounds for heading a rivet. This capacity is ample for 3/8-inch cold iron rivets. Previous types of hydraulic presses of this capacity weigh approximately 300 pounds. The throat of the yoke is 6 by 6 inches, and the ram stroke is 3 inches. A companion model press with a 4-inch reach weighs only 45 pounds.

The press is easily handled, a spring type suspension being provided so that hardly more exertion is required than for handling a pair of pliers. The button at the top of the press handle gives complete control of the entire operating cycle, including the necessary safety features. Pressure on this button gives a rapid advance stroke at moderate pressure until the die touches the rivet; then the hydraulic pressure generator, operating at a working pressure of

5000 pounds per square inch, automatically delivers the pressure required to head the rivet. At the peak pressure, the ram is automatically reversed and returns to the starting position with a rapid reverse stroke at moderate pressure. At the end of the reverse stroke, the control valves automatically move to neutral and the oil-pump unit idles at zero pressure until the next cycle is started.

In steady production riveting, with

the rivets placed by the helper in advance of the press, a time cycle of 2 1/2 seconds per rivet is easily maintained. The press will not repeat, and it is necessary to release the control button and depress it again to start another cycle of operations. An instantaneous safety stop is also provided which operates at any point in any riveting cycle, permitting the operator to "catch" and prevent the completion of the stroke if the rivet head is not in the die or if the rivet is not properly aligned in the hole.—Booth No. 104

### Geometric Threading Machine with Sliding Die-Head

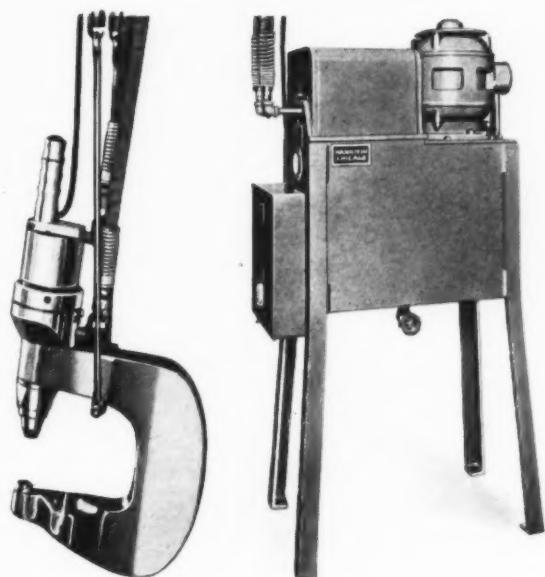
**A**HAND-OPERATED threading machine embodying many improvements is to be introduced by the Geometric Tool Co., New Haven, Conn. This machine is designed for general-purpose work and is equipped for rapid production.

An unusual feature is that the spindle carrying the die-head advances to the work, which is held stationary. The spindle slides in a quill mounted on large taper roller bearings. Power is transmitted from the quill to the spindle by means of a spider, the trunnions of which are mounted in ball bearings. This construction insures a very sensitive sliding action and prevents any undue drag on the threads being cut.

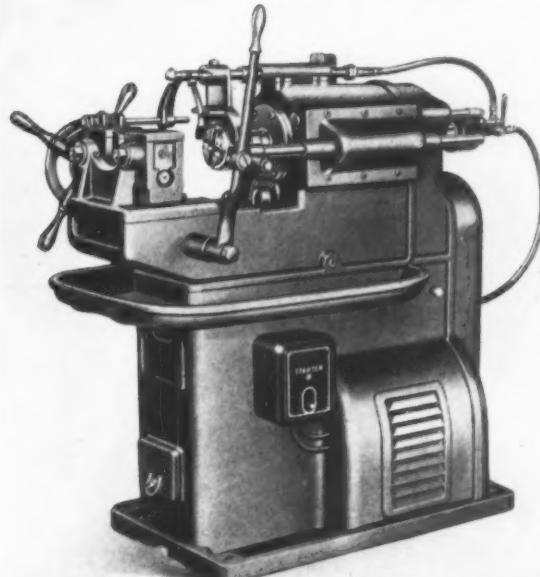
Although the machine does not

come equipped with a work-holding device, the standard screw type stationary vise of this company's manufacture can be furnished mounted on a carriage, or special work-holding devices can be supplied.

Either the Style KD die-head using milled or tapered chasers or the Style TR using tangent or circular chasers can be furnished. The machine can also be equipped with collapsing taps. Four speeds ranging from 642 to 176 revolutions per minute are available. The machine has a capacity for cutting 1/4- to 1-inch straight threads with eight threads per inch or finer; and 1/8- to 3/4-inch standard pipe threads. The spindle has a travel of 5 inches.—Booth No. 103



Hannifin Portable Hydraulic Riveter and the Pressure Generator



Geometric Threading Machine in which Work is Stationary and Die-head Advances

*Pratt & Whitney Exhibits Several New Machines*

**A**PART from the new jig boring machine illustrated and described on page 27 of this number of *MACHINERY*, the Pratt & Whitney Co., Hartford, Conn., will exhibit several new machines that have not been previously described in the technical press. Among these are a No. 3B plain die-sinking machine, two 14- and 16-inch tool-room lathes, two gear-grinding machines, and a Keller GG automatic tool-room machine.

The No. 3B plain die-sinking machine illustrated is designed for straight die-sinking only. It is believed to be the heaviest die-sinking machine of its type ever built, the total weight being almost 4 tons. This machine has ample capacity for "hogging" out work rapidly, and at the same time has been designed with the aim of making it heavy enough to maintain its accuracy when taking fine finishing cuts. The large table surface and clearance under the spindle provide for a wide range of work, the working surface of the table being 15 by 40 inches, and the clearance under the spindle 23 1/2 inches. The knee and table design will support heavy blocks safely. Eight spindle speeds are provided ranging from 75 to 1060 revolutions per minute.

Power feed to the table can be furnished if desired; this is a self-contained unit driven by a separate motor containing six power feeds to the table in either direction. This entire unit can be attached easily, either when the machine is new or later.

One of the two new gear-grinding machines is a 10-inch hydraulic gear grinder for spur and helical gears. This is of the single-wheel type, in which the wheel travels back and forth on a horizontal ram while

grinding the teeth. The gear teeth being ground are controlled by a master gear and rack, so that an involute shape is generated on each tooth. The other gear-grinding machine is the two-wheel type of helical gear-grinder in which certain types of both spur and helical gears can be finished at high speeds.

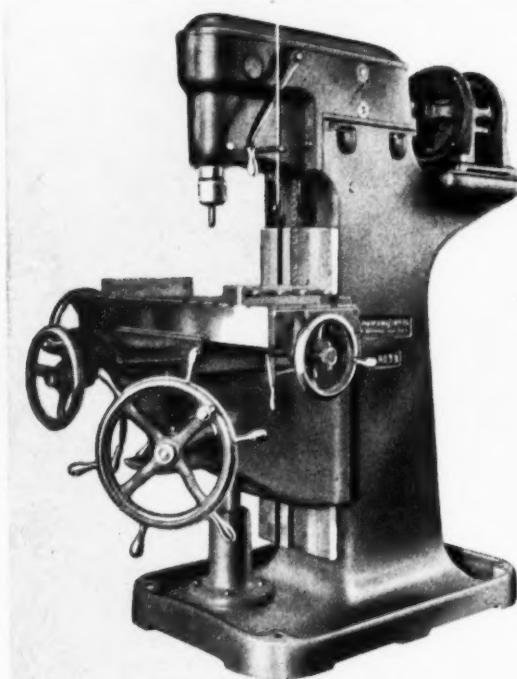
The Keller GG automatic tool-room machine is of a smaller size than the Type BL which has been on the market for a number of years. This machine will be engaged in performing an interesting series of automatic operations at the Show.—*Booth No. 906*

*Arter Hydraulic Rotary Surface Grinder and Automatic Piston-Ring Grinder*

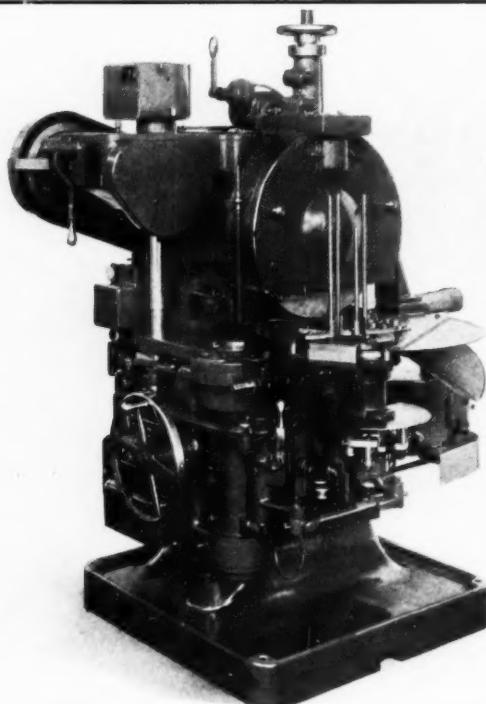
**T**HE magnetic chuck of a rotary surface grinder to be introduced by the Arter Grinding Machine Co., 15 Sagamore Road, Worcester, Mass., is driven by V-belts from a hydraulic motor. A flange-mounted electric motor is built into the bed of the machine, and on an extension of the motor-shaft, two oil-pumps are mounted in tandem. The higher pressure pump delivers oil to the hydraulic motor through a valve to provide an infinite number of chuck speeds, while the lower pressure

pump delivers oil to a cylinder for moving the wheel-slide hydraulically.

The magnetic chuck of this machine, which is shown in Fig. 2, rests on a flat-track bearing instead of being mounted on a spindle. The claim made for this construction is that the mounting is not disturbed by the wheel pressure, regardless of the diameter, weight, or shape of the work. The work-table can be tilted for grinding concave or convex surfaces. An automatic hydraulically operated attachment can be provided



*Pratt & Whitney Die-sinking Machine—the Heaviest of its Type Ever Built*



*Fig. 1. An Arter Piston-ring Grinder that has Twice the Output of the Previous Model*

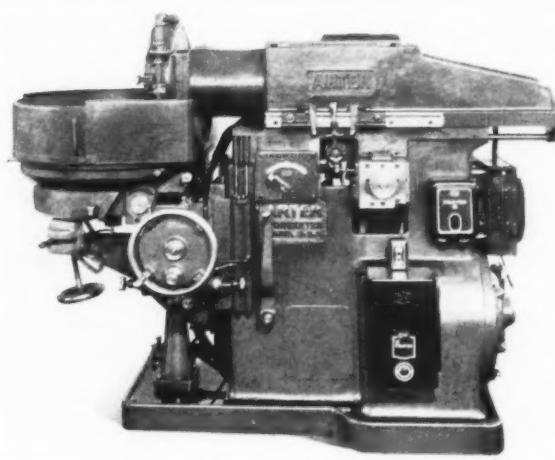
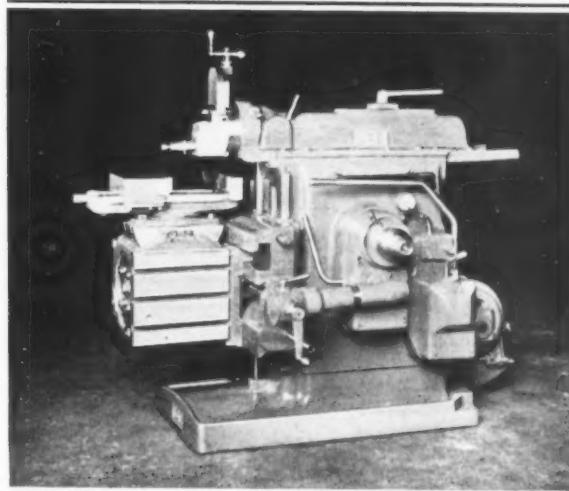


Fig. 2. Surface Grinder with Hydraulic Rotary and Straight-line Movements



Compactness is a Feature of the Latest Gould & Eberhardt Shaper for the Tool-room

for elevating the work-table. This machine is built with chucks 9, 12, and 16 inches in diameter.

An automatic piston-ring grinder of recent design will also be displayed by the concern. The wheel-spindle of this machine, which is shown in Fig. 1, is positioned eccentrically in a quill, both the spindle and quill running in ball bearings. The wheel is fed down on the work by rocking the quill. The feed is under control of a cam, and each cycle consists of a rapid lifting movement of the wheel from the work, a fast approach to the work, a slow grinding feed, and a dwell against a positive stop.

The piston-rings are placed in a vertical magazine and are carried by a plate from the magazine to the constantly revolving magnetic chuck. An automatic switch controls the chuck. During each cycle, a ring is ground, removed from the chuck, and another ring is carried to the chuck. The production of this machine is about double that of the previous model.—Booth No. 108

**A safer way to gain assurance against inflation than by keeping cash in the corporation's till might be to convert it into overdue equipment replacements, which could not depreciate as rapidly as money.—**

Clarence K. Streit

### Gould & Eberhardt Tool-Room Shaper

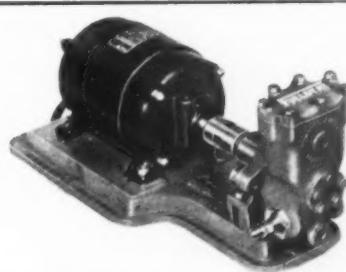
GOULD & Eberhardt, Newark, N. J., have brought out 14-inch and 16-inch tool-room shapers designed especially for tool and die work and similar operations. The essential features may be summarized as follows:

(1) Range of strokes from 12 to 165, or 15 to 200, depending upon the style and size of machine. (2) Rapid power traverse for the table in either direction. (3) Automatic cross-feed to the table, operated by a single cam synchronized with the return stroke of the ram. Sixteen feeds from 0.006 to 0.100 inch are available. (4) Tool-head provided with a single-control head lock, securely locking the head in any position. (5) A circulatory pressure system of lubrication, supplying oil directly from the pump to the ram guide ways and the entire linkage system. Cascade oiling for the main internal transmission. (6) Double-crank gear transmission of tested conventional design. (7) Cross-rail arranged with a single plate and nar-

row guide for the table slide, greatly reducing deflection. (8) Rail clamp which permits locking the rail in any position. The hand control for elevating and lowering the work-table has been brought to the operating side of the machine. (9) Offset vise having one side of the jaws projecting over the side of the table. (10) Selected transmission gears within the frame and slide placed on multiple spline shafts mounted on Timken bearings. (11) Compact motor drive arrangement with direct-connected drive of either chain, multiple, V-belt or gears.

The illustration shows the 14-inch tool-room universal shaper. On the 16-inch size an extension base and table support are available. The universal table illustrated can be swiveled 180 degrees and the work surface tilted up to 15 degrees in either direction.—Booth E

### Tuthill "Fuelstat"



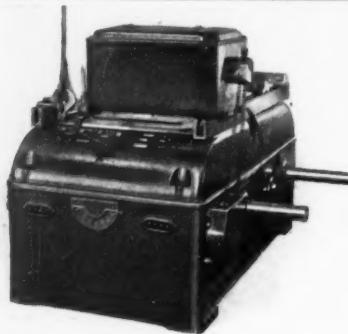
Tuthill "Fuelstat"—a Control for Oil-burner Units

A COORDINATED fuel control intended for application to oil-burner units of coke ovens or to heating apparatus of small furnaces has recently been developed by the Tuthill Pump Co., 131 W. 63rd St., Chicago, Ill. This control, which is known as "Fuelstat," includes a strainer, pump, and pressure regulating valve. Cut-away models of the unit, which will show variations in design, will be presented at the Show. Pumps of new design will also be exhibited.—Booth No. A-204

## THE CLEVELAND EXPOSITION

### Reeves Hydraulamic Controller for Regulating Variable-Speed Transmission

A HYDRAUMATIC control so sensitive that a pressure of only two or three ounces, moving a lever



Reeves Hydraulamic Controller for Automatic Variable-speed Regulation

a very small fraction of an inch causes a variation in speed, will be one of the exhibits of the Reeves Pulley Co., Columbus, Ind. The total elimination of backlash or lost motion in maintaining the desired speed is a feature of the new control, which supplements rather than replaces the electric and mechanical automatic controls of this company's manufacture, although the new con-

trol may ultimately prove to be more universally adaptable.

As with the other two controls, the Hydraulamic control is actuated by an indicating lever attached by cable, arm, link, or chain to a compensating or floating roll, pressure regulator, float, moving part of a machine, or any other element from which indication of the required speed can be taken. The indicating lever is attached to one of the shifting levers of the transmission through a differential mechanism and vertical and horizontal rods, as shown in the illustration. Movement of the lever in a lateral direction is transmitted to the shifting levers which vary the effective diameters of the disks and V-belt, increasing or decreasing the speed of the variable-speed shaft of the transmission and hence that of the driven machine. This control can be applied to machines now in use as well as to new transmissions.

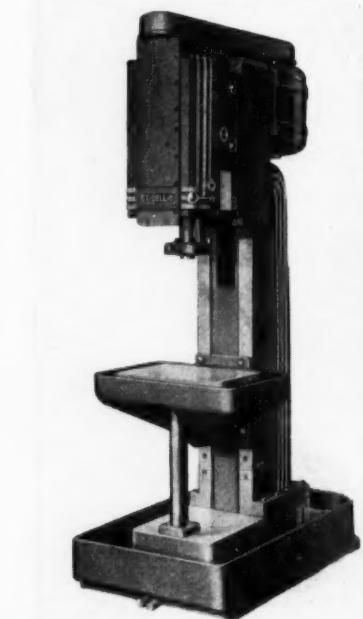
Another new product to be exhibited is a standard mounting for the gear reducer and Vari-speed motor pulley of this company's manufacture. This mounting of the two units on a common base permits a direct drive from the pulley to the reducer. This base is available in all standard sizes of the Reeves motor pulley unit. —Booth No. E-209

### Ex-Cell-O Hydraulic Power Units and Hydraulic Drilling Machine

TWO new models of the hydraulic power unit made by the Ex-Cell-O Aircraft & Tool Corporation, 1200 Oakman Blvd., Detroit, Mich., are to be exhibited. These units are particularly adapted for drilling, reaming, counterboring, spot-facing, and similar operations. They can be mounted either singly or in multiple, and in a vertical, horizontal, or angular position.

The smaller unit, No. 23-A, has an 8-inch stroke, a feed range of from 1 to 32 inches per minute, and a rapid approach and return of 300 inches per minute. The larger unit, No. 25-A, has a 10-inch stroke, a

Fig. 1. Ex-Cell-O Drilling Machine with Hydraulic Power Unit



feed range of from 1 to 32 inches per minute, and a rapid approach and return of 230 inches per minute. Two forward feed rates which are independently adjustable can be selected while the unit is in operation, to suit the particular cut to be taken.

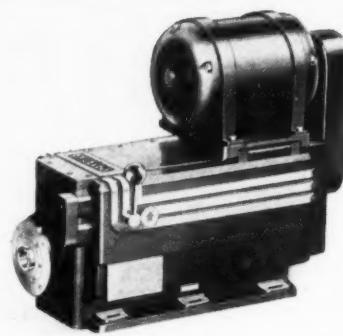


Fig. 2. Ex-Cell-O Hydraulic Power Unit of Improved Design

A single-purpose, heavy-duty drilling machine of vertical type equipped with a hydraulic power unit, as shown in Fig. 1, will also be exhibited. This machine is intended for manufacturing operations. The table can be positioned at three heights. Multiple-spindle heads can be attached to the flange at the lower end of the spindle quill. There is a machined pad on each side of the base and of the power unit to provide for using guide bars, when required. Motors of 2, 3, 5 or 7 1/2 horsepower can be furnished on these hydraulic power units to meet requirements.—Booth No. 812

***The efficient use of machinery creates many new industries that provide increased employment, help to increase wages, and make a higher standard of living possible. A nation can have no more than it produces—but if it will, it may have all that it is capable of producing by the use of up-to-date machinery and equipment.***

## PROMINENT FOREIGN MANUFACTURING AND ENGINEERING EXECUTIVES



SENATOR GIOVANNI AGNELLI,  
President and Managing Director,  
Fiat Co., Torino, Italy



HENRY GEORGE KING, Works Manager  
of Platt Bros. & Co., Ltd., Hartford  
Works, Oldham, England



C. O. LINDQUIST, Works Manager  
of Aktiebolaget Bolinder-Munktell,  
Eskilstuna, Sweden



GRADITLO, Engineer, Member of the  
Central Executive Committee of the  
U.S.S.R.



HAROLD HEATH, Works Manager  
of Humber Ltd. and Hillman Motor  
Car Co., Ltd., Coventry, England



SHOTARO IKEGAI, President of the  
Ikegai Iron Works, Ltd., Shiba, Tokyo,  
Japan



WILLIAM HROMADKO, Chief Engi-  
neering Manager, Skoda Works Ltd.,  
Praha, Czechoslovakia



DR. ING. FRITZ MODERSOHN,  
Direc. of Eng., A. Borsig Maschinenbau  
A.G., Berlin-Tegel, Germany



F. J. PHILIPS, Gen. Mgr. of Machine  
Shops, N. V. Philips' Gloeilampen-  
fabrieken, Te Eindhoven, Holland

## PROMINENT FOREIGN MANUFACTURING AND ENGINEERING EXECUTIVES



*R. K. EVANS, Managing Director,  
Adam Opel A. G., Russelsheim am  
Main, Germany*



*ARTHUR SYKES, Director and Chief  
Engineer, David Brown & Sons, Ltd.,  
Huddersfield, Yorkshire, England*



*B. H. LUNDBORG, Works Manager,  
Husqvarna Vapenfabriks A.B., Hus-  
qvarna, Sweden*



*A. WINTER, Designer of Dneprostroy,  
Member of the Central Executive Com-  
mittee, U.S.S.R.*



*OSCAR A. WIBERG, Tech. Manager  
and Chief Eng., Svenska Turbinfabriks  
A.B. Ljungstrom, Finspong, Sweden*



*F. SAMUELSON, Engineer of Turbine  
Design and Manufacture, British Thom-  
son-Houston Co., Rugby, England*



*JOHN ARTHUR ROPER, Chief Engi-  
neer, Platt Bros. & Co., Ltd., Hartford  
Works, Oldham, England*

# Ingenious Mechanical Movements

Mechanisms Selected by Experienced Machine Designers  
as Typical Examples Applicable in the Construction of  
Automatic Machines and Other Devices

## Cam-Plate with Adjustable Lobes

By JOHN A. HONEGGER

Recently, in developing an automatic machine, the writer had to provide a means for transmitting an oscillating motion to an arm or lever from a rotating shaft. The arm was attached to a slide which was returned to the zero position by means of a coil spring after having reached its maximum position.

The variation in the sizes of the product made necessary an occasional change in the length of travel or movement of the slide. To obtain the desired adjustability with the least number of actuating parts, the adjustable cam-plate shown in Fig. 1 was developed. The two side plates *A* are spaced a given distance apart by spacers *B* and are clamped together by screws *C*. Four cam-plates *D*, spaced 90 degrees apart, are held on pivot studs *E*.

Circular slots *F* are milled in these plates through which clamp bolts *G* are inserted.

These plates are a sliding fit between the plates *A*, so that when bolts *G* are tightened, cam-plates *D* are held securely in place. To the outer side of one end plate *A* is fastened the flanged bearing *H*, which is held by a cross-pin to the actuating shaft *I*. The lever arm roller *J* of the actuating arm was made wide enough to allow it to ride on both the central cam lobe and on the periphery of side plates *A*. The various distances to which the cam lobes can be projected and the angles of rise and fall are shown in Fig. 2. This particular cam has four adjustable lobes, but a larger or smaller number of lobes can be used. If the cam is made large enough, a design of the type shown in Fig. 3 can be employed.

It will be noted that when the cam lobes are approximately fully extended, the curves of the lobes tend to approach an involute curve. It may be pos-

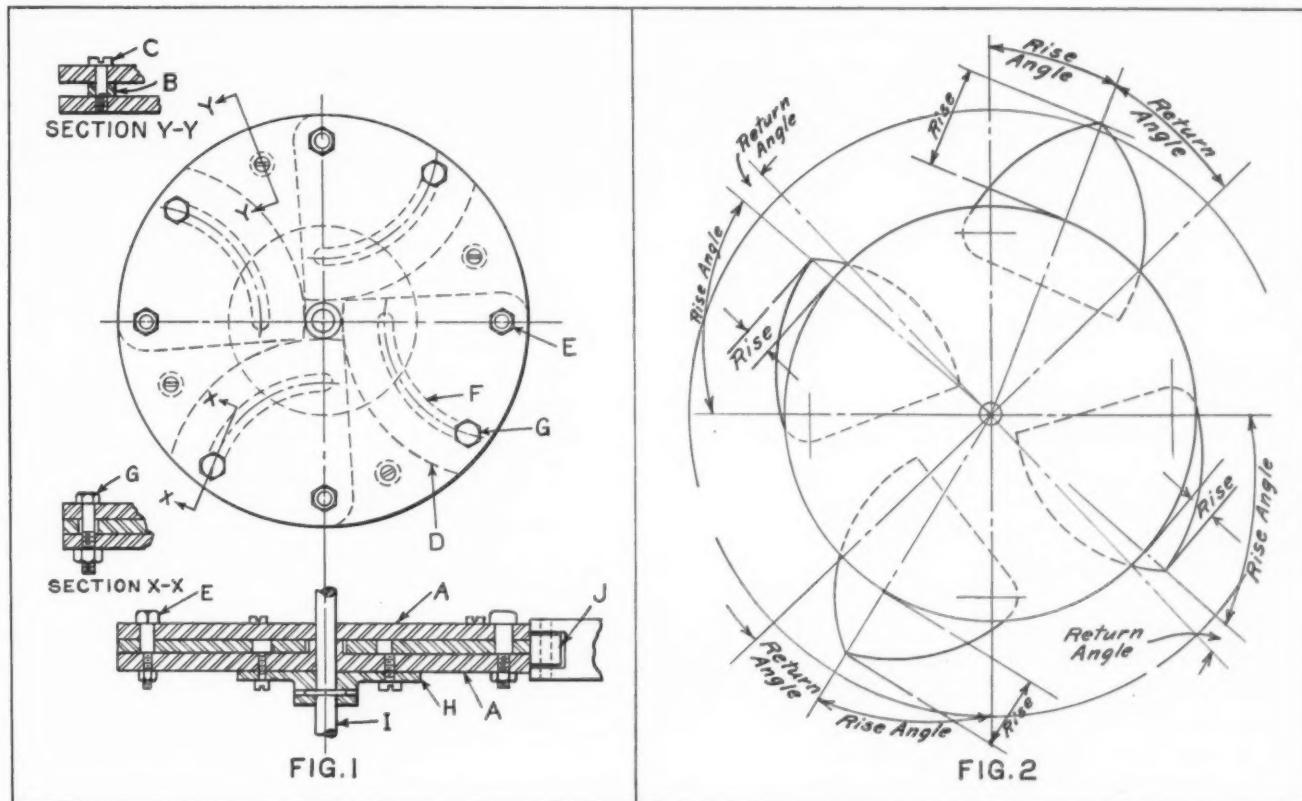


Fig. 1. Cam-plate Provided with Four Adjustable Lobes for Varying the Throw

Fig. 2. Diagram Showing Cam Lobes Set in Different Positions to Indicate the Range of Adjustment

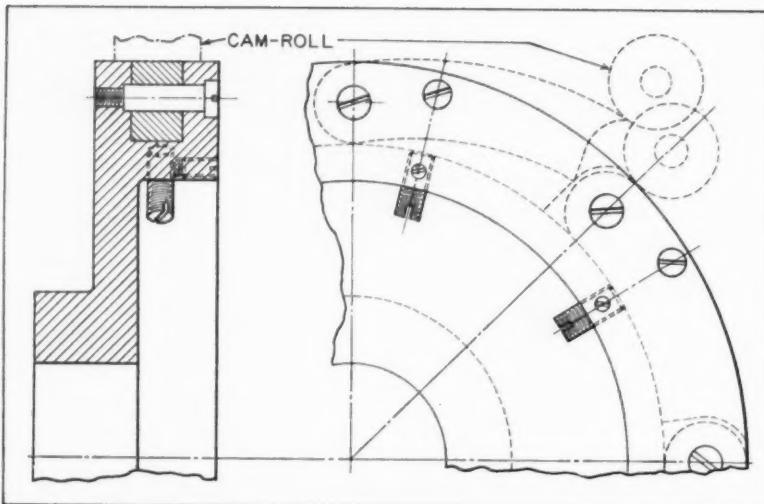


Fig. 3. Type of Adjustable Lobe Designed for Large Cams

sible in some cases to develop a series of interchangeable lobes which will take the place of many special cams required for different jobs.

### Crank Motion that Causes Slide to Dwell at Center of Stroke

By J. E. FENNO

An interesting crank mechanism is incorporated in a certain carton wrapping machine for changing the position of the carton as it passes through the machine. This mechanism, shown in the illustration, imparts a reciprocating movement to the work-slide *A*, with a dwell at the center of its stroke in each direction. The slide is reciprocated in the stationary guide *D* through link *B* by the crank *E*. This crank is a free fit on shaft *F*, but is normally constrained from rotating with the shaft by means of the arm *G*. Arm *G* is keyed to the shaft and has a spring-actuated plunger *H* which automatically engages and disengages the notches cut in the flange on the crank.

A pin *J* in the plunger projects through and below arm *G*. When this pin engages the cam-block *K*, which is secured to the machine frame, the pin and the plunger are moved radially outward. This causes the plunger to disengage the notch and allows the crank and slide to dwell while the shaft continues to rotate.

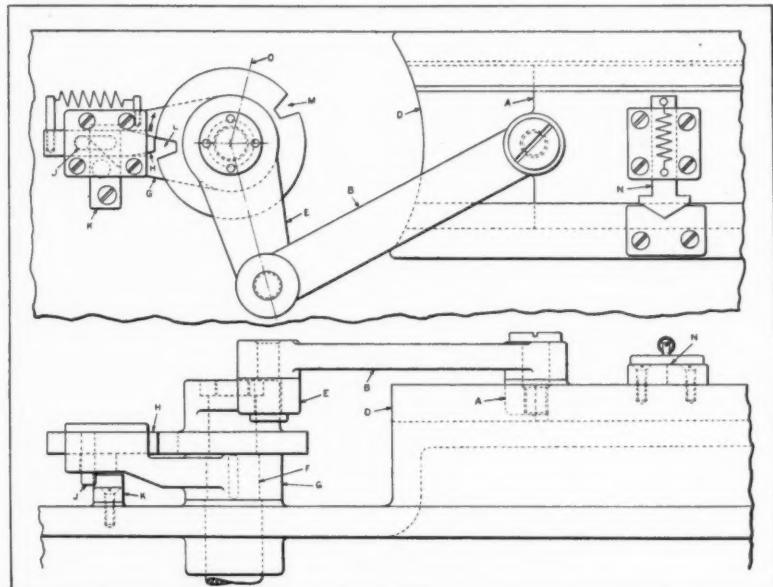
The shaft and arm *G* are rotated in the direction indicated by the arrow. In the position shown, pin *J* has engaged cam-block *K* and has withdrawn the plunger from the notch *L*. At this time, the slide is at the center of its stroke; and since the plunger is all that locks the crank *E* to the shaft, the shaft will turn in the

bore of the crank hub and allow the crank and slide to dwell. A spring-actuated V-plunger is provided at *N* to hold the slide securely in the "dwell" position.

Now, as the shaft and arm continue to rotate, pin *J* leaves cam-block *K* and allows the end of the plunger to ride on the periphery of the crank flange until it drops into notch *M*. When this occurs, the crank is once more locked to the shaft so that continued rotation of the shaft will cause the slide to move toward the left and return to the position shown. At this time, the center line of the crank will coincide with center line *O* and cam-block *K* will have forced pin *J* outward, thus disengaging the plunger from its notch and allowing the crank and slide to dwell.

The withdrawn plunger then rides along the periphery of the crank flange until it drops into notch *L* and locks the arm to the crank again. The rotating arm now rotates the crank, causing the slide to move this time toward the right and then back to the position shown. At this point, the cam-block once more disengages plunger *H*. This completes one cycle of movements, which is repeated for each revolution of shaft *F*.

It will be noted that the angular movement of the crank is different for each half of the slide cycle, owing to the angular position of the connecting-rod *B*. This results in a variation of the time interval for each succeeding dwell and stroke. Fortunately, however, this variation is permissible. In other applications, where the dwell and stroke must have the same time interval, the well-known Scotch yoke crank movement could be used instead of the crank and connecting-rod shown. In this case, the notches would be located in the flange diametrically opposite each other.



Reciprocating Slide Mechanism with Dwell at Center of Stroke

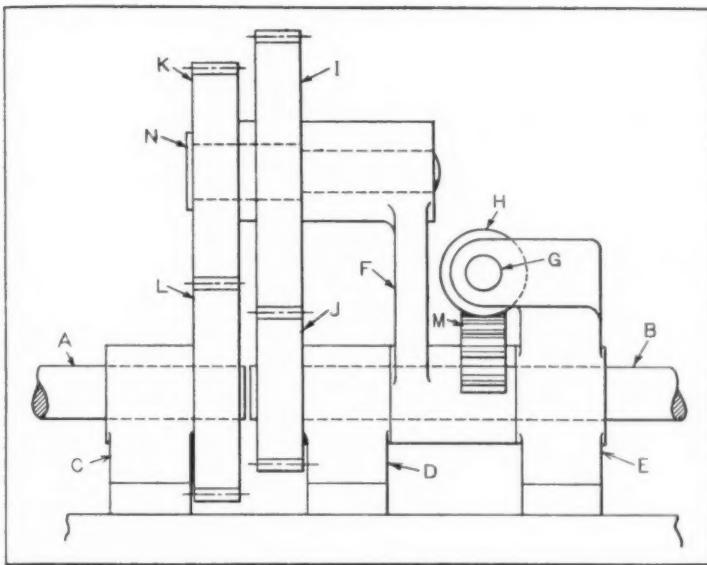


Fig. 1. Mechanism for Varying Relative Rotative Positions of Driving and Driven Shafts

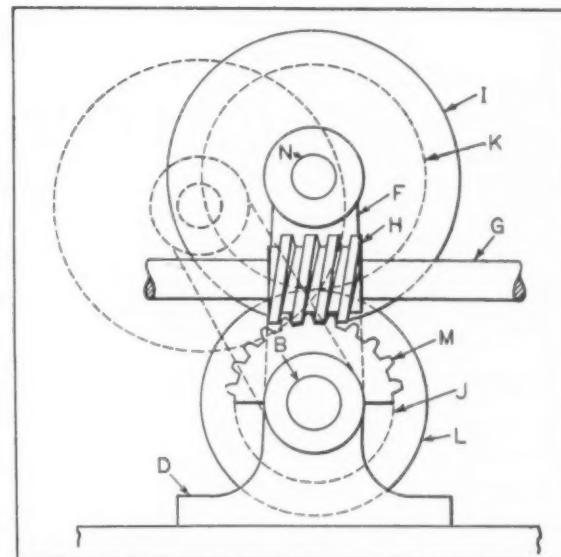


Fig. 2. End View of Timing Mechanism Illustrated in Fig. 1

## Mechanism for Timing a Revolving Shaft

By L. KASPER

The accompanying illustrations show the construction of a mechanism by which the relative positions of two revolving shafts may be varied while in operation. Referring to Fig. 1, the speed ratio between shafts *A* and *B* is constant, but the relative rotative positions of the two shafts can be varied by means of the worm *H* and the worm-gear *M*. This mechanism is used in a wire-forming machine on which the timing of one section of the machine must be changed relative to the timing of another section.

The driving shaft *B*, supported by bearings *D* and *E*, carries the gear *J*, which is keyed to it. Bracket *F* is free on shaft *B*, and carries the stud *N*, which supports gears *I* and *K*. The two latter gears are free to rotate as a unit. Gear *L* is keyed to shaft *A*, which is supported by bearing *C*. Each of the gears *K* and *L* have 18 teeth, while gears *I* and *J* have 24 and 12 teeth, respectively.

Power is transmitted from shaft *B* through gears *J*, *I*, *K*, and *L* to shaft *A* at a 2 to 1 ratio in the same direction. Worm *H* is keyed to shaft *G*, which is supported on the upper end of bearing *E*. Shaft *G* carries a handwheel (not shown) on one end, by means of which the worm is rotated. Worm *H* meshes with the worm-gear *M* on bracket *F*, causing the latter to rotate on shaft *B* when the handwheel on shaft *G* is turned. In Fig. 2, the dotted outlines of bracket *F* and gear *I* show the rotative movement around shaft *B* produced by the action of worm *H* and worm-gear *M*.

A better understanding of how the change of timing between shafts *A* and *B* is accomplished may be had by assuming these shafts to be stationary. Then, as bracket *F* is caused to rotate on shaft *B* as an axis, gear *I*, meshing with gear *J*,

will be rotated on stud *N* as an axis in the ratio of 2 to 1. As the axes of shafts *A* and *B* coincide, gear *K* rotates around shaft *A*.

If gear *K* were independent of gear *I* it would revolve on stud *N* as an axis in the ratio of 1 to 1 with shaft *A*, but as gears *I* and *K* are fixed together, and must revolve as a unit at a ratio of 2 to 1 with shaft *B*, gear *L* will be revolved in the reverse direction. The ratio of rotation between gears *K* and *L* will still be 1 to 1, but each of the gears will revolve one-half turn in opposite directions. As gear *L* is keyed to shaft *A*, the latter must revolve with it. Under actual operating conditions, the effect is merely that of a gear train until the handwheel is turned, at which time shaft *A* is advanced or retarded as the bracket *F* is rotated forward or backward.

\* \* \*

## Reducing Costs by Flash-Welding Automobile Radiator Shells

Automobile radiator shells ordinarily require stampings of considerable size. By making two small stampings and flash-welding them, it is possible to make a worthwhile saving in costs. A flash-welder, built by the Thomson-Gibb Electric Welding Co., Lynn, Mass., which is used by one automobile manufacturer for this purpose makes two welds, one on each side of the shell, during each welding cycle. Because of the size of the parts, provisions are made to insure accurate alignment and correct dimensions of the finished work. In addition to the regular electrical contacting jaws and electrodes, there is a set of steel gripping jaws, as well as quick-acting hand-clamps. Unit clamping structures, which can be lifted off the machine and replaced, allow for quick change-over from one job to another.

# Engineering News Flashes

## *The World Over*

### **Gear Shift with 11,000 Speeds**

It is reported that the California Institute of Technology at Pasadena has developed a gear shift having over 11,000 definite speeds. This is believed to be the largest number of gear changes ever obtained through a positive gear shift. Four shift levers are employed, each of which can be set in a number of positions. This gear shift is employed for controlling speeds in connection with equipment used for testing pumps for the Colorado River aqueduct. The pump speeds start at 1/2 revolution per minute and can be increased by half-revolutions to 5000 revolutions per minute.

### **Huge Diesel Engine Made in Denmark**

The recently installed 15,000-kilowatt Diesel engine at Copenhagen, Denmark, is said to be the largest Diesel engine in the world. In fact, it is claimed to be 50 per cent larger than the next engine in size. It is part of a large electric power station. This Diesel engine is a double-acting, two-stroke, "uniflow scavenger" type, with mechanical injection. It operates at 115 revolutions per minute. It has eight cylinders approximately 33 inches in diameter, and a piston stroke of 59 inches.

### **New System of Direct-Current Transmission**

A completely new system for the transmission and distribution of electric power, making it possible for the first time to interconnect, with static apparatus, non-synchronous systems, has been developed. This has been done by the utilization of electronic devices, including Thyatron and Phanotron tubes. With the new system, a higher order of stability has been obtained, as contrasted with previous practice, and faults such as short circuits result in reduced, instead of increased, power flow in the circuit involved.

Direct-current power transmission by constant current is not, in itself, new, but the present development represents the first time that such transmission has been accomplished in such a manner as to be applicable on a commercial scale by means of electronic tubes. The new system was described in a paper presented at the annual meeting of the

American Institute of Electrical Engineers in New York City by C. H. Willis of Princeton University, and B. D. Bedford and F. R. Elder of the General Electric Co.

### **Improvement in Electroplating Process**

According to *Industrial Britain*, a young chemist with the firm of Coleman & Appleby, Ltd., Birmingham, England, has developed a plating formula by means of which any article leaving an electroplating bath will have a brilliant polished surface, superior to that obtained by mechanical polishing. It is claimed that the process will decrease production costs by a considerable margin. From the meager information at hand, it appears that the process is applicable to plating with various metals, chromium and nickel being especially mentioned.

### **World's Largest Direct-Current Fan-Cooled Motor**

What is claimed to be the world's largest direct-current, fully enclosed, fan-cooled motor was recently built by the Reliance Electric & Engineering Co. by using arc-welded construction and Lincoln Electric Co.'s welding equipment. The motor is 7 1/2 feet long and weighs 14,000 pounds. It is rated at 125 horsepower, running at 300 revolutions per minute, and will be used to operate a steel mill pickling machine. By winding the motor for 400 revolutions per minute, it will deliver 200 horsepower.

### **Machines that Run in Hydrogen**

The advantages of providing an atmosphere of hydrogen instead of air for the operation of rotating electrical machinery are referred to in the *Compressed Air Magazine*. Hydrogen-cooled synchronous condensers have been employed for several years, but now the application has been extended to frequency changers. The superiority of hydrogen as a cooling medium permits a saving in the size of machines of equal power rating. The windage loss with hydrogen is approximately 10 per cent of

that with air. The use of hydrogen also eliminates the tendency toward the formation of corona. A new frequency changer made by the General Electric Co. for the Pennsylvania Power & Light Corporation for the purpose of converting 60-cycle, three-phase power into 25-cycle, three-phase power is arranged to run in hydrogen.

### Clock with Dial 30 Feet in Diameter

The biggest clock in the southern hemisphere, and one of the largest in the world, has recently been made in Leicester, England, for the Rand Airport in South Africa. The dial of this clock is 30 feet in diameter. It will be let into the ground so that its face will be visible from the sky thousands of feet above. The face is made of concrete. The works, which will be operated by electric power, are contained in a subterranean chamber constructed so as to be water-tight. The materials used in the clock are proof against corrosion. The two hands will be illuminated at night.

### Shafts with Hard-Faced Bearings

An effective method of providing shafts with long-wearing bearing surfaces has been developed which promises to be of considerable value to machine builders. Briefly, the method consists of hard-facing the portions of the shaft that are in contact with the bearings. To ultimately obtain a straight cylindrical shaft of uniform diameter, a 1/16-inch over-size shaft is used to begin with. The bearing portions of the shaft are grooved to receive the hard-facing material. The excess stock and hard-facing material can then be ground off, thus producing a straight shaft with hard-faced surfaces where the bearings are to be located.

According to *Oxy-Acetylene Tips*, the hard-facing of some 1 15/16-inch shafts in the manner described constituted one of the important improvements made recently in a wrapping and slicing ma-

chine. These shafts were 54 inches in length and were hard-faced in several places for the installation of roller bearings.

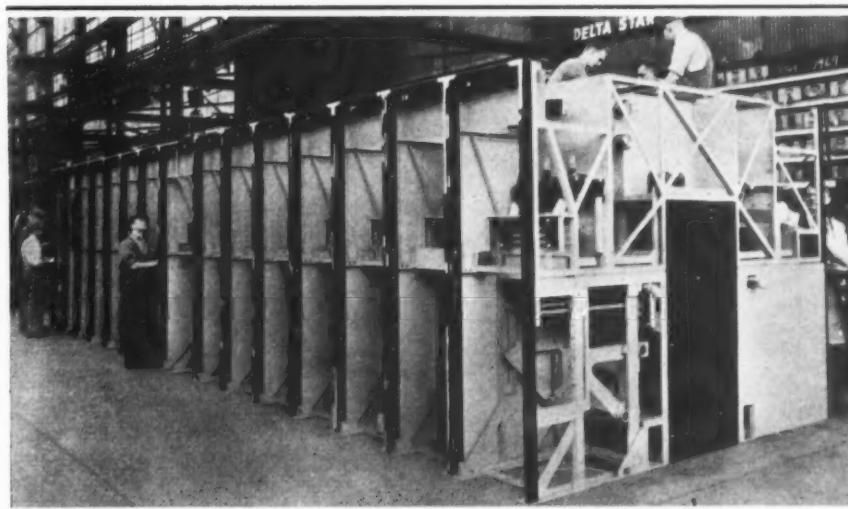
### High-Strength Glass Procured by Heat-Treatment

A casehardened glass having from four to six times the strength of ordinary plate glass is being made by the Libby-Owens-Ford Glass Co. This glass also has a high resistance to the effects of heat. It is claimed that hot lead can be poured on a piece of this glass placed on a cake of ice without causing the glass to crack. A piece of ordinary plate glass that has been finished to size, edged, and polished, can be treated to acquire these unusual qualities. The glass is put in an electric furnace and heated very nearly to the plastic state and then subjected to blasts of cool air.

### "Local Boys Make Good"

Under the heading "Local Boys Make Good," *Industrial Britain* refers to a business achievement that may not be so unusual in the United States, but that is rather exceptional in the Old World. In 1910, two brothers started to make bicycles in Birmingham, England, in a shack in the slum district, for which they paid \$6 a month in rent. After a year of hard work, they found that they had made enough money to extend their "factory," and covered an adjoining yard with another shack. The war interfered with their activities, but after the war, they continued their business with such success that today, their plant covers thirteen acres and employs 3000 people. Last year they manufactured 600,000 bicycles, and this year are planning to produce 750,000—more than the production of any other bicycle manufacturer in the world. The company is known as the Hercules Cycle Co. Incidentally, this company spent approximately \$1,250,000 a year in advertising.

High-voltage, Metal-clad Switch-gear for the Boulder Dam Power House, which is being Built at the Plant of the Delta-Star Electric Co. in Chicago. This Switch-gear Controls the Motor-driven Auxiliaries Handling the Station Lighting, Intake Power, Spillway, Elevators, Oil-handling, and Pump Equipment for the Lubrication of the Machines. This Switch-gear May Well be Termed the "Nerve Center" of the Power Plant

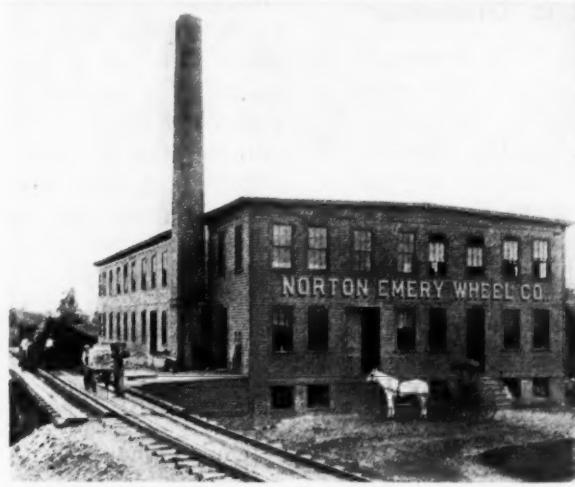


# Norton Company Celebrates Fiftieth Anniversary

ON June 20, 1885, the Norton Emery Wheel Co.—the forerunner of the present Norton Co., of Worcester, Mass.—was incorporated. Hence, this year the Norton Co. can look back upon fifty years of achievement in the grinding wheel and grinding machinery fields, as well as in the abrasive products field in general.

The history of the Norton business, however, really dates back to 1873, when the first vitrified emery wheel was made in a rambling one and one-half story wooden plant on Water St. in Worcester. Five years of discouraging trials and experiments continued, until in 1879, F. B. Norton started to manufacture commercially what was known as the Norton Emery Wheel. These early beginnings led to the incorporation of the company six years later. The following year, the company erected the first building of its own plant, and from that time on, its growth, as is well known, has been steady and continuous.

Not only has the plant



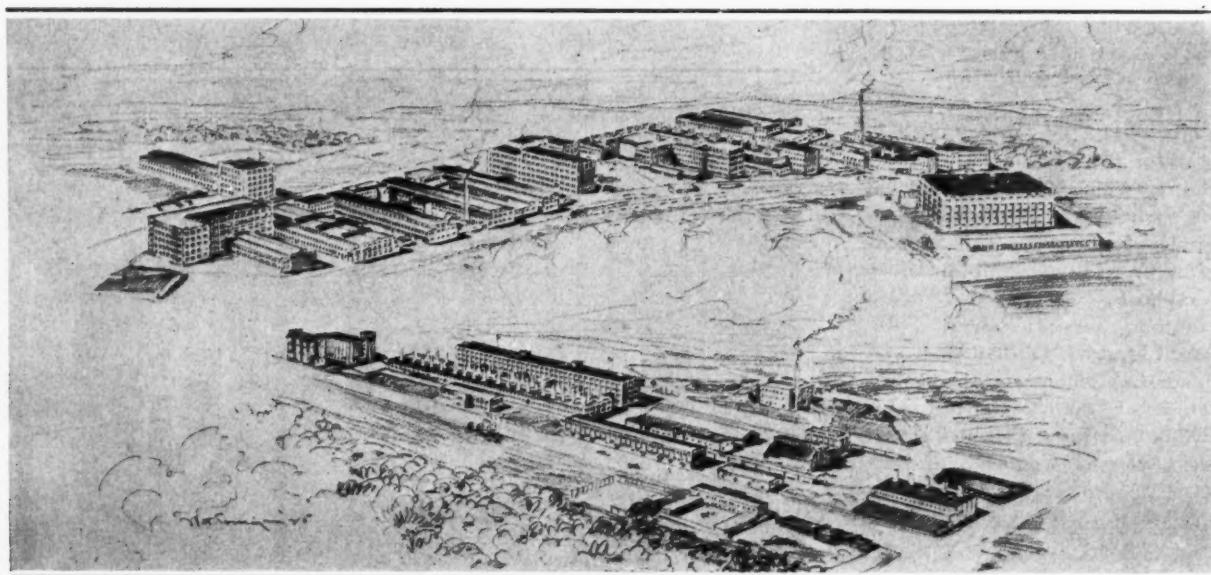
*The First Norton Plant as it  
Appeared in 1886*

*The Norton Co.'s Worcester Plant  
as it Appears Today*

in Worcester grown to proportions beyond the boldest dreams of its founders, but the company also owns plants in many other parts of the United States and abroad, including an abrasive plant at Chippawa, Canada; a plant for mining bauxite at Bauxite, Ark., the Behr-Manning Corporation at Troy, N. Y., and the Norton Pike Co.'s plants at Pike and Littleton, N. H., as well as a German plant at Wesseling, Germany; a Canadian plant at Hamilton, Ont.; a French plant at La Courneuve, France; an

English plant at Welwyn Garden City, England, and an Italian plant at Corsico, near Milan, Italy.

The various developments of the company in the grinding wheel and grinding machine fields have been recorded from time to time in *MACHINERY*. With the later of these developments *MACHINERY*'s readers are therefore thoroughly familiar. A brief review of some of the earlier ones, however, may prove of interest at this time.



It was in 1877 that Franklin B. Norton patented an emery wheel bonded by the vitrifying process. In 1893, grinding wheels of natural corundum were first made; in 1900, the first Norton grinding machines were placed on the market; and in 1901, a new artificial abrasive of unusually high quality for precision grinding, called Alundum Abrasive, was introduced. Charles H. Norton, the designer of the Norton machine for precision grinding, was awarded the John Scott medal, as was also A. C. Higgins, now president of the Norton Co. for his water-cooled electric furnace patented in 1904, which furnace resulted in a revolution in the production of Alundum Abrasives. In 1904, came the first production grinding machines for crankshafts and camshafts, and in 1910, the first automatic grinding machine built by the company. Since that time the development of the company's products is a matter of recorded history in the technical and trade journals.

\* \* \*

### Shaper with Special Attachments for Boulder Dam Shop

A 36-inch heavy-duty shaper equipped with several unusual attachments was recently shipped by the Ohio Machine Tool Co., Kenton, Ohio, to the machine shop at Boulder Dam. In the right-hand view of the accompanying illustration, this shaper is shown equipped with a circular power feed to the head, which is commonly known as a concave attachment. A circular table, complete with hand and power feeds, is mounted on the regular table and connected to the regular feed mechanism. In the left-hand view of the illustration, the same table and feed mechanism are shown mounted on the apron to provide a convex attachment. The central view shows the shaper with a tilting top mounted on the regular table.

### Ford Plant Being Air-Conditioned

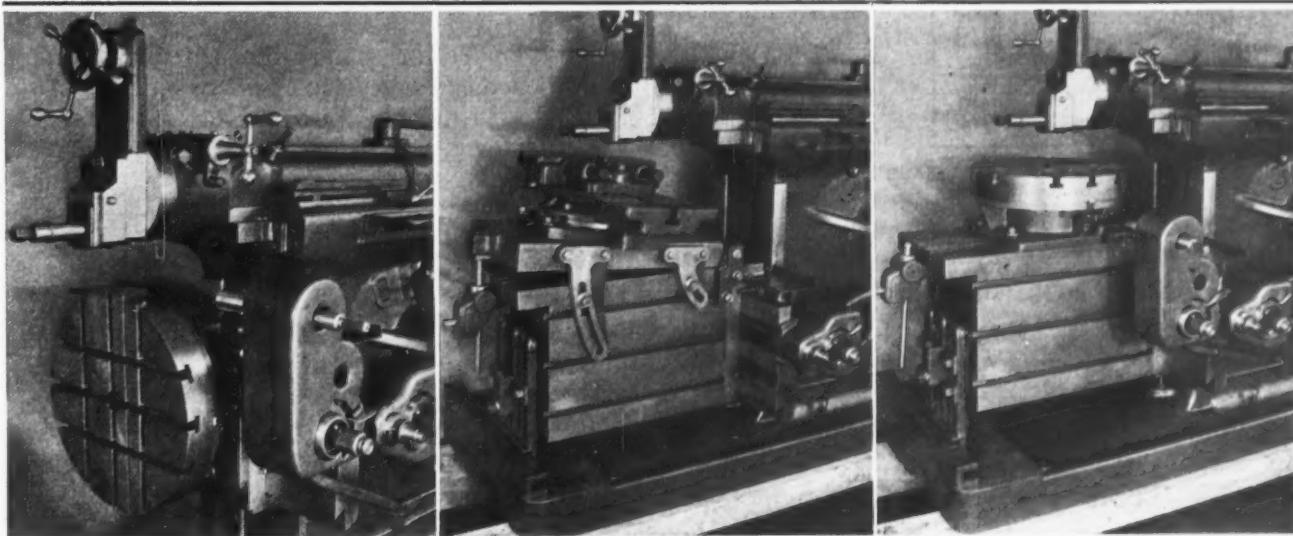
The first automobile plant to install temperature regulation and air-conditioning equipment in the machine shop and foundry is the Ford Motor Co. At the Rouge plant of this company, air-conditioning has already been installed in 200,000 cubic feet of building space, and another 75,000 cubic feet is to be air-conditioned.

The purpose is threefold—to control the accuracy of fine machining operations, such as cylinder lapping; to increase the comfort of the workmen; and to protect the processes from dust and dirt. For several years, the company has controlled the temperature in its gage rooms. Within recent months, temperature regulation has been extended to inspection rooms in various parts of the plant, and a short time ago the cylinder-lapping room was air-conditioned.

The importance of this innovation may be realized from the fact that the air-washing apparatus, which has previously been used to supply outside air to the foundry, collects about 42 cubic yards of dirt a week, or about 42 tons. While it will be impossible to control the temperature entirely in the foundry, because of the great heat radiated from the ladles of molten metal while casting is in progress, the temperature and humidity will be greatly reduced and the comfort of the men increased.

In the cylinder-lapping room, temperature regulation was undertaken because there has been a measurable variation in the sizes of the cylinders on very hot days, as compared with cooler days. Control of the temperature of the lapping compound as it flows over the cylinder blocks is also of importance.

It is planned to extend temperature regulation to the rooms where cylinder blocks are bored before lapping and to rooms where crankshafts, camshafts, pistons, and flywheels are finished.



Special Attachments Supplied for a Shaper Recently Installed in the Machine Shop at Boulder Dam

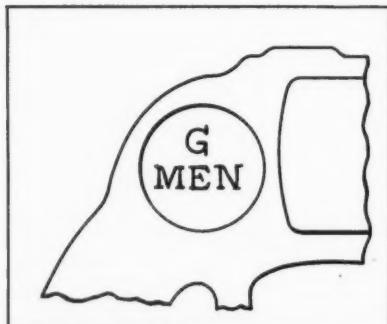
# Questions and Answers

**H. R. D.**—Is there any way of eliminating or reducing the porosity of arc-welded joints in assemblies made up of pieces formed from heavy sheet aluminum?

**A.**—Up to the present time all metallic arc welds in aluminum have been found to be somewhat porous, regardless of the welding procedure employed. This porosity is apparently produced by entrapped gas, and is usually rather evenly distributed throughout the weld. It apparently does not affect the strength of the weld greatly; but in cases where the weld must be ground smooth, it may detract from the finished appearance. A 5 per cent silicon electrode seems to minimize the porosity (probably because of its lower melting point and greater fluidity), and it can sometimes be further reduced by using an over-size electrode and the highest permissible current.

## Marking on Metal Toys

**E. T.**—A metal toy pistol is painted solid black. We wish to fill the indentation in which the lettering is placed with white paint and then rub off the excess paint, so as to leave white letters standing out on the black background. The indentation is about  $1/64$  inch deep. Can anyone suggest a high-production method for accomplishing this that we could use to advantage instead of a hand operation?



Toy Pistol which is to be Marked with White Lettering

This question is submitted to MACHINERY's readers who have had actual experience with work of this character.

## Tools for Drilling Slate

**R. C. B.**—What type of drill is required for drilling  $7/8$ -inch holes through slate panels?

## A Department in which the Readers of MACHINERY are Given an Opportunity to Exchange Information on Questions Pertaining to the Machine Industries

**A.**—According to an article by J. M. Highducheck in the February, 1933, number of MACHINERY, tungsten-carbide tipped tools are used by the Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., for drilling slate and marble. Flat drills tipped with tungsten carbide have proved much more

economical for drilling slate than twist drills tipped with the same material. The shanks for such tools are made from steel having a carbon content of 0.50 to 0.63 per cent; manganese, 0.60 to 0.90 per cent; phosphorus, 0.04 per cent; and silicon, 0.15 per cent. The tungsten carbide used for the tips of the drills is Carboly 119 or Firthite XS.

The cutting speeds range from 235 revolutions per minute for drills 1 inch in diameter to 540 revolutions per minute for drills  $7/16$  inch in diameter. The feed per revolution is approximately 0.025 inch for these sizes. Drills of this kind are used in radial and sensitive drilling machines without employing a coolant. The points of the flat drills are ground to an angle of 45 degrees (90 degrees included angle), and with a side clearance. The shank for a  $7/8$ -inch drill is made from  $5/8$ -inch stock. The flat point is forged to a thickness of  $3/8$  inch to give the required diameter for finish-grinding.

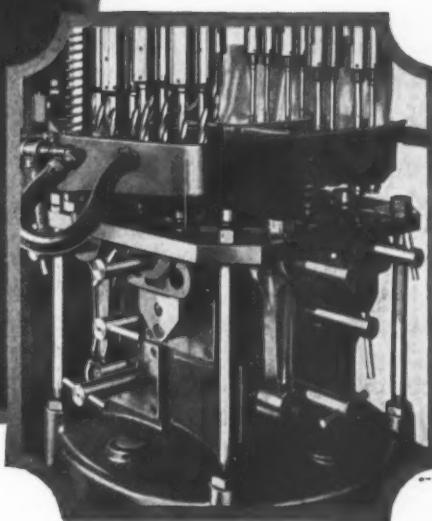
## Excessive Wear in Worm-Gears

**M. L. H.**—I have a worm-gear speed reducer in which the worm is located above the gear and in which all parts are splash-lubricated by the same oil, which has a viscosity of 85 seconds at 210 degrees F. After only four months' operation I notice considerable worm wear. What is likely to be the trouble?

Answered by the Editor of "Oil-Ways," Published by the Standard Oil Co. of New Jersey

Your problem is undoubtedly one of under-lubrication. In this type of worm-gear unit, the worm, being located above the gear, receives only such oil as is carried to it by the gear. Your 85-second oil is too light to be carried by the gear to the point of contact. We recommend using an oil of 120 seconds at 210 degrees F. viscosity. You might check carefully to make sure that the oil is at the proper level.

# Design of Tools and Fixtures



## Special Tool for Boring Small Spherical Cavities

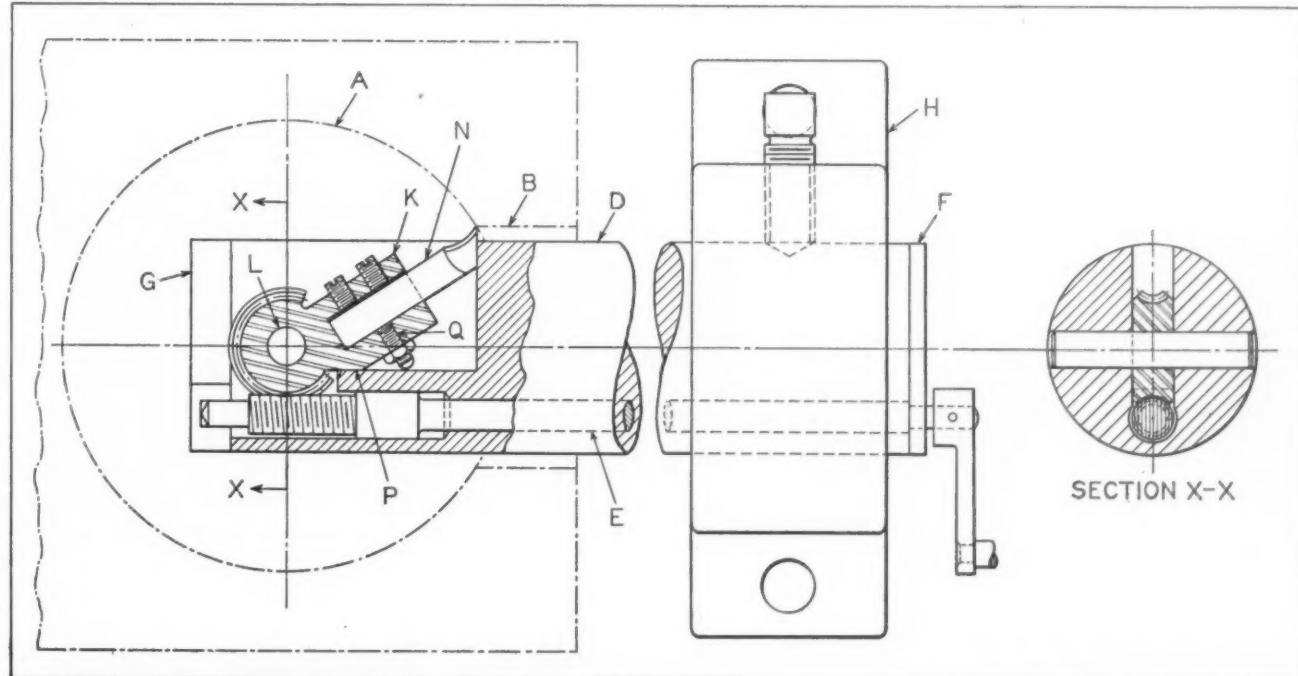
By JOHN A. HONEGGER, New York City

The writer recently found it necessary to machine a spherical cavity in several hundred brass castings. The spherical cavity *A* and the bore *B*, shown by the dot-and-dash lines in the accompanying illustration, were cored in the casting and were required to be finished with a fairly smooth surface. The special tool shown was designed to perform the required machining operation on a lathe. The bar *D* of this tool has a slot milled in its end in which the tool-holder *K* is fitted. This holder

pivots on pin *L* and has a segment gear portion which meshes with the worm on shaft *E* that extends through the bar *D*.

End play of the worm-shaft is prevented by plates *F* and *G* which are fastened to the ends of bar *D* by screws and dowels. Plate *G* is of tool steel, and is hardened. The conical end of shaft *E* which takes the thrust against plate *G* is also hardened. The pin *L* is held in place by a cross-pin (not shown). The tool-holder is made a push fit in the slot in the boring-bar to insure as little side play as possible.

The tool *N* is of round cross-section and is held in place by two headless set-screws. The tool-holder, when in the zero position shown, is stopped



Special Tool for Boring Spherical Cavity and Bore Leading to Cavity

by the shoulder at *P*. If desired, an adjusting screw *Q* can be inserted, as shown, for making adjustments when grinding tool *N*. The worm-shaft *E* is actuated by the crank-handle fastened to the outer end of the shaft by means of a cross-pin.

Bar *D* is held in position at the right height by the holder *H*. This holder is fastened to the turret of a lathe. The bar *D* is held in position in the holder by a set-screw, the conical point of which enters a conical spot machined in bar *D*.

In operation, the tool is set and the bar fed into the cored hole to the position shown, by advancing the turret-slide until it comes in contact with a depth stop, after which the crank-handle is turned, causing the tool-block to swivel through the angle required for finishing the spherical cavity indicated by the dot-and-dash lines at *A*.

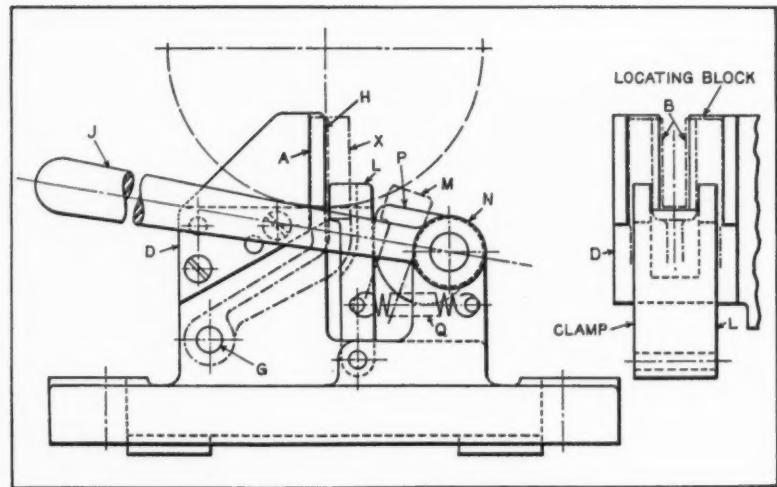


Fig. 1. Wide-opening, Cam Type Clamp Applied to Milling Fixture

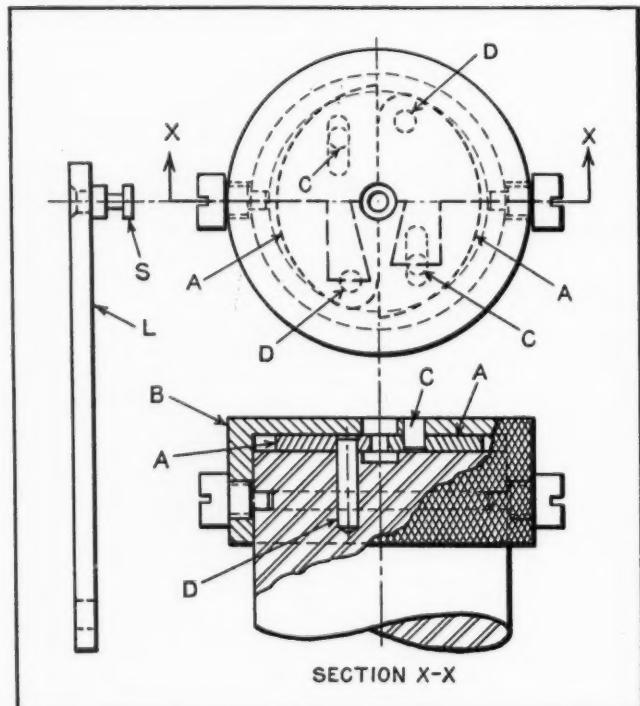
neck became compressed, causing the width of the groove forming the neck to become too narrow.

In the fixture shown, the additional support necessary to prevent compression of the rivet neck is furnished by leaves *A*. These leaves are moved in and out by turning the knob *B* which "cams" the leaves into the slot of the stud through the action of pins *C*; the pins are a press fit in knob *B* and a slip fit in the slots in leaves *A*. The sides of the leaves take the additional riveting thrust. The leaves *A* are pivoted around pins *D*, fixed in the body of the anvil.

### Riveting Fixture for Necked Stud

By C. COLE, Dayton, Ohio

The accompanying illustration shows a fixture designed for riveting the stud *S* to the lever *L*. Formerly, an ordinary anvil was used which had a hole 1/8 inch in diameter in its end for locating the rivet, the rivet being supported only on its outer end against the blows of the riveting hammer. With this method of holding the rivet, the



Riveting Mandrel with Leaves *A* that Close in around Neck of Stud *S* when Knob *B* is Turned

### Clamps Designed to Give Wide Opening for Work

By F. SCRIBER

The designing of fixtures is not always merely a matter of planning for the locating and clamping means. Frequently the most troublesome task is to make suitable provision for the quick or convenient removal of the work from the fixture. This problem arises when the locating points are so arranged that it is necessary to lift the work out of a locating groove or over a lug. The accompanying illustrations show two methods of holding and clamping work which have proved very satisfactory under such conditions.

In Fig. 1, surface *A* of the work *X* is clamped in a recessed seat in a steel block *D* that locates the work from both sides for milling the groove *B*. Block *D* is attached to the side of the cast-iron base. The work is also located over a stud *G*. The upper end of the work must be swung to the right on stud *G* so that the surface at *A* will clear the edge *H* of the fixture. The work can then be pushed along stud *G* and swung into the locating recess in block *D*.

Handle *J* is swung to the right through 180 degrees to permit putting the work in place. This allows the swinging clamp *L* to assume the position

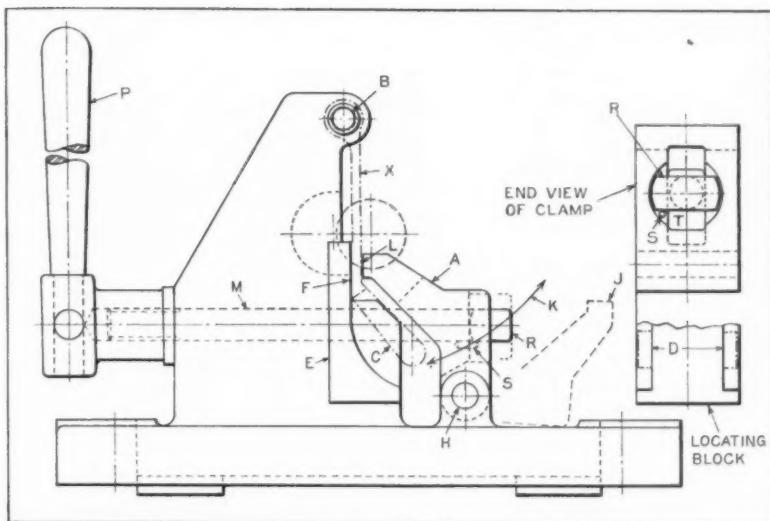


Fig. 2. Fixture with Swinging Clamp Slotted for T-head of Bolt

shown by the dot-and-dash lines  $M$ , as the low portion  $N$  of the cam  $P$  permits the spring  $Q$  to act.

The operator holds the work *X* against the surface *A* and swings lever *J* to the left-hand position in order to clamp the work in place. Clamp *L* has a slight radial floating action on its hinge pin.

The wide opening of the clamp shown in Fig. 2 is obtained by using a quarter-turn screw and slotted clamp arrangement. The work at *X* is located over pin *B*, and being cut away on the end *C* so that it will straddle a block of width *D*, is swung into place over the latter block. This locating block is a part of the main block *E* and locates the work sidewise while the pin locates it vertically. The work is clamped against the surface *F*.

The clamp *A* can be swung on stud *H* to the position indicated by the dotted lines at *J*. The work is placed on the stud *B* and swung into place along the line *K*, after which the clamp is returned to the work-holding position *A*. The screw-head *R* is next turned a quarter revolution until it is located against the stop-pin *S*. The handle *P* is then pulled forward, causing the head *R* of the long screw *M* to tighten the clamp on the work at *L*.

The operation of the clamp will be better understood by referring to the view in the upper right-hand corner of the illustration, where the screw-head *R* is shown located against pin *S*. In removing the work, the operator releases handle *P* and turns the head *R* 90 degrees, so that it will pass through the slot *T*.

## Adjustable Templet and Master Plate for Automatic Cutting Machine

By JOSEPH WAITKUS, Wellsville, N. Y.

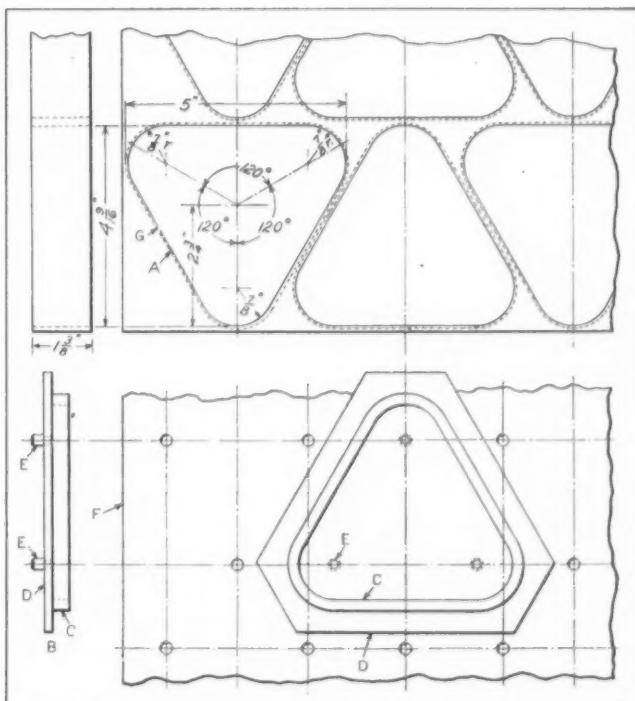
Recently it was necessary to cut out several hundred triangular-shaped pieces from steel plate 1 3/8 inch thick. The dimensions of these pieces

are shown at A in the accompanying illustration. The amount of material and the time available for filling the order were at a premium, and every possible step was taken to reduce these two factors.

In using the automatic cutting machine, a templet is first made according to dimensions depending upon the size of the object to be cut out and the width of the cut made by the torch. The templet used in this case is shown at *B*. It consists of a guide rail *C*, fastened to a plate *D*. Three pins *E* are also fastened to plate *D*. A master plate *F* was next laid out and drilled to conform to the arrangement of the pins in the templet.

The important feature of the master plate is that it permits the templet to be moved to a new position as each piece is in the material. At the same time, it enables the templet to be used in a predetermined best suited to conserve material. The line *G* indicates the path of the torch. This is determined by the thickness of the material, which determines the size of the cutting torch.

advantages of the arrangement are obvious. The templet is necessary; thus each piece will be the same dimensions. Time is saved in setting up the templet, because the master plate definitely determines the location of each piece to be cut. The layout of the templet can be worked out to allow the minimum amount of waste material between the pieces, as indicated by the lay-out in the upper portion of the illustration.



## Templet and Master Plate Method of Guiding Torch in Cutting Duplicate Pieces from Steel Plate

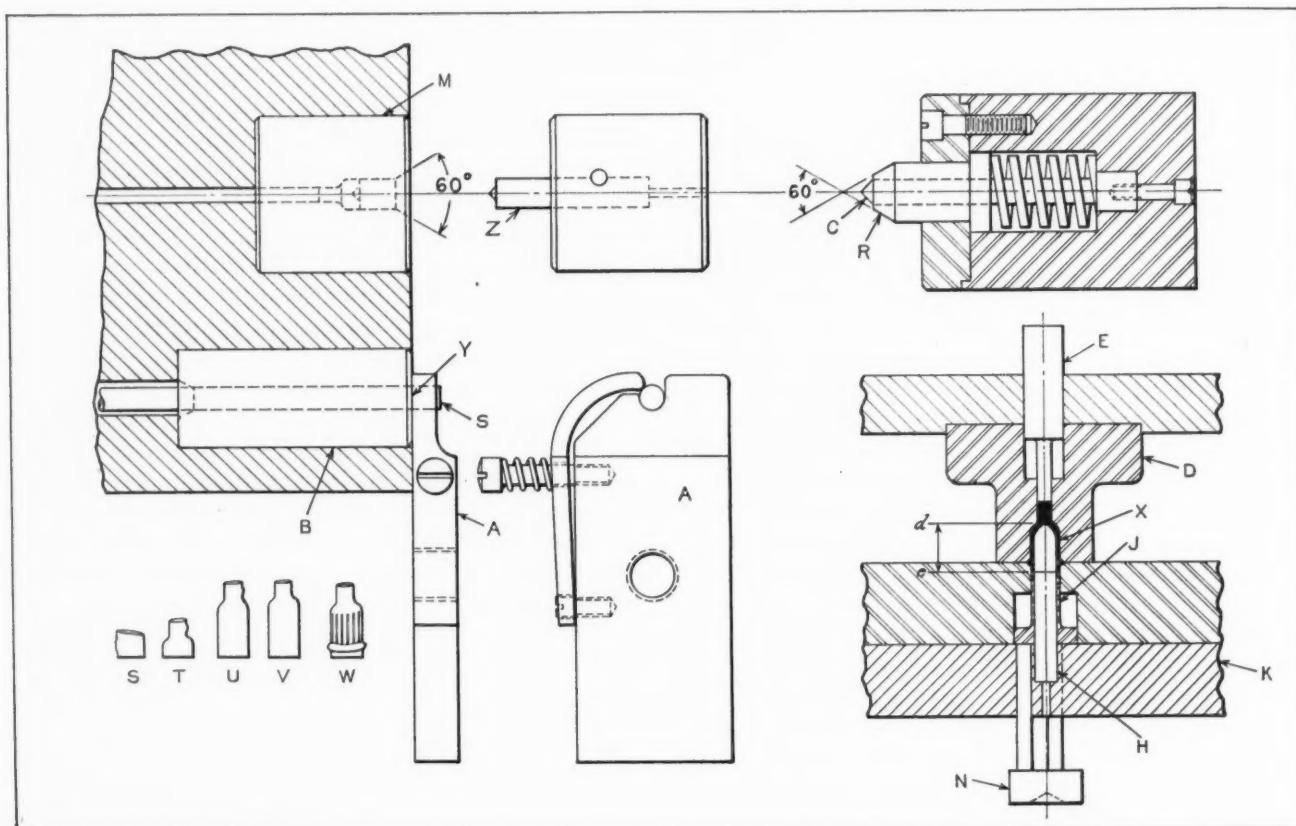
## Extruding and Forming Caps from Bronze Wire

By WILLIAM C. BETZ, Equipment Engineer  
The Fafnir Bearing Co., New Britain, Conn.

Bronze caps of the shape shown at *W* and *X* in the accompanying illustration are produced in three operations by the extrusion process. By using this process instead of drawing the caps from flat blanks, there is a great saving in the number of operations required, as well as in the material and the cost of equipment. The caps are produced from bronze wire on a double-stroke heading machine.

The final operation, which produces the knurling shown in the view at *W* and upsets the part to form the bead near the outer end of the cap, is performed in the die shown in the lower right-hand corner. For this operation, the work is slipped on punch pilot *H*, which is fastened in the die-bolster *K*. As the press ram descends, the cap enters punch *D* until it bottoms. As the distance from *d* to *e* is less than the over-all length of the trimmed blank, the blank buckles when punch *D* comes in contact with the top of the die, forming the bead shown in the view at *W*.

As the press ram ascends, a cam, coming in contact with member *N*, raises the knock-out *J*, push-



Dies for Cutting Slugs *S* from Bronze Wire and Forming Them into Caps *W* by the Extrusion Process

The slug *S* is cut off at *Y* between the cutter *A* and the quill *B*, following which it is carried to the die *M*. At the first stroke of the ram, it is struck to the shape *T* by the punch *Z*. At the second stroke, the blank is extruded to the shape *U* by the punch *C*.

To insure accurate guiding and alignment of extruding punch *C*, the shedder *R* is ground on the end to an angle of 60 degrees and concentric with the punch bore. The die into which this shedder fits is also machined to an angle of 60 degrees so that there can be no looseness or misalignment. The extruded blank *U* is next trimmed to length, the uneven edge thus being removed. A special cap-trimming lathe with a chute feed trims the cap at the rate of over 400 an hour. One girl can feed two of these machines.

ing the finished blank out of the die. As the cam passes the center, knock-out *J* drops back to the position shown in the illustration, so that the die is ready to receive the next cap. Punch *D* carries the finished cap up until it is ejected by the upper knock-out *E*. As the work falls, a jet of compressed air blows it into a chute at the back of the press. This air blast is controlled by a valve operated either from the gate of the press or from a cam fastened on the left end of the crankshaft. From 800 to 1000 pieces an hour are produced.

The extruding punch should be ground and lapped and the end should be shaped as shown, the angle being sufficiently acute to allow the metal to extrude or flow upward around punch *C*. The finish produced on the caps is exceptionally smooth, both inside and out.

# NEW TRADE



# LITERATURE

## Rolled Steel for Machine Building

ILLINOIS STEEL Co., 208 S. LaSalle St., Chicago, Ill., and CARNEGIE STEEL Co., Pittsburgh, Pa. Joint booklet entitled "Rolled Steel for Machine Construction," dealing with the use of rolled steel, in conjunction with flame cutting and welding, for the construction of machinery and machine parts. This booklet contains a great deal of information of value alike to the plant executive and to the engineering, production, and purchasing departments. It is an instructive and well illustrated presentation of the application and use of rolled steel to welded machine frames and machine parts.

## Vulco V-Belt Drives

GATES RUBBER Co., 999 S. Broadway, Denver, Colo. Bulletin DH-300, comprising a complete guide for selecting or designing V-belt drives. The book contains information by means of which any drive can be completely designed and the price determined. One section of the book discusses the care of V-belt drives and outlines an easy way of checking tensions. Other sections include simple instructions for the design of V-V drives, quarter-turn drives, double-V drives, and V-flat drives.

## Electric Controlling Apparatus

ALLEN-BRADLEY Co., 1331 S. First St., Milwaukee, Wis. Bulletin illustrating and briefly describing the principle of design underlying the Bulletin 709 solenoid type starters, which combine simplicity and compactness of construction with high current interrupting capacity. Examples indicating the wide variety of enclosures provided for these starters are shown, and ratings are given for the three sizes of starters.

## Chucks, Collets and Tool-Holders

APEX MACHINE & TOOL Co., Dayton, Ohio. Catalogue entitled "Production Tools," illustrating and describing the company's line of safety friction chucks, quick-change drill

*Recent Publications on Machine Shop Equipment, Unit Parts, and Materials. Copies can be Obtained by Writing Directly to the Manufacturer.*

and tap chucks, positive-drive chucks, vertical float tapping chucks, drill collets, floating tool-holders and tap sleeves, stud-setters, screwdrivers, universal joints, and universal-joint socket wrenches.

## Abrasive Cut-Off Wheels

NORTON Co., Worcester, Mass. Catalogue containing information on Norton abrasive cut-off wheels. The catalogue describes the advantages of these wheels, characteristics, types of bonds, and application for various classes of work. A table listing the best wheel to use for different kinds of materials, and a table of comparative operating costs using cut-off wheels and saws are included.

## Power Squaring Shears

NIAGARA MACHINE & TOOL WORKS, 637-697 Northland Ave., Buffalo, N. Y. Bulletin 72-E, illustrating and describing Niagara power squaring shears equipped with the patented Niagara hold-down device which automatically clamps the sheet and holds it during the entire time it is being cut. The bulletin covers machines having capacities for 5/16-inch soft steel and lighter.

## Air Compressors and Condensers

WORTHINGTON PUMP & MACHINERY CORPORATION, Harrison, N. J. Bulletins L-620-B5A and L-620-B6B, illustrating and describing, respectively, Worthington air compressor units for oil and gas engine starting, and air compressor units for general industrial uses. Bulletin W-200-B2A, descriptive of Worthington surface condensers with patented folded tube layer arrangement.

## Hard-Facing by Arc Welding

LINCOLN ELECTRIC Co., Cleveland, Ohio. Booklet entitled "How to Make It Wear Longer by Hard-Facing and Overlaying." This book explains in considerable detail the method of hard-facing surfaces by means of arc welding, and specifically deals with "Hardweld," "Wearweld," "Toolweld," "Abrasoweld," "Manganweld," and "Stainweld A" electrodes and their application.

## Safety Devices

WILLSON PRODUCTS, INC., Reading, Pa. Catalogue entitled "Willson Products—Protective Devices for Head, Eyes, Nose, and Throat," illustrating and describing a great number of important means for safeguarding the worker in industrial plants, including goggles, fiber spectacles, welding helmets and hand shields, respirators, and abrasive blasting helmets.

## Tapping Equipment

R. G. HASKINS Co., 4634 Fulton St., Chicago, Ill., is distributing to users of tapping equipment a chart prepared to give detailed information on percentages of threads that can be obtained by using certain sizes of tap drills. The chart gives the size of tap, number of threads per inch, basic diameter, tap drill diameter, and percentage of full thread.

## Sound-Absorbing Materials

JOHNS-MANVILLE, 22 E. 40th St., New York City. Booklet entitled "Johns-Manville Sound Control of Mechanical Equipment," containing a discussion of the problem of sound control in air-conditioning systems, oil-burners, metal furniture, and other equipment, as well as a description of the various materials used in typical installations.

## Portable Electric Tools

MILLERS FALLS Co., Greenfield, Mass. Catalogue 4, covering the complete line of electrical tools made by this company. Among the new products announced are a high-speed hand grinder, a light adjustable

clutch screwdriver, 3/8-inch special, 1/2-inch special, and 1-inch standard drills, and two bench grinders.

#### Wire and Wire Products

REPUBLIC STEEL CORPORATION, Massillon, Ohio. Catalogue designated "Form Adv. 226-B," illustrating and giving detailed information relating to the company's wire rods, spring wire, coppered wire, cold-heading wire, stainless-steel wire, iron wire, wire nails and brads, and other wire products.

#### Multiple-Spindle Automatics

CLEVELAND AUTOMATIC MACHINE Co., 2267 Ashland Road, Cleveland, Ohio. Bulletin 17, illustrating and describing in detail the company's new Model K multiple-spindle automatic machine, and giving complete specifications pertaining to the different sizes of the four-spindle and six-spindle machines.

#### Chromium-Plating

PRATT & WHITNEY Co., Hartford, Conn. Circular 414, illustrating three typical chromium-plating jobs indicative of the class of work the company is in a position to handle, and briefly describing the services and facilities available to firms requiring the chromium-plating of work for wear resistance.

#### Spray Painting

BINKS MFG. Co., 3114 Carroll Ave., Chicago, Ill. 16-page loose-leaf catalogue on spray-painting equipment and accessories, including spray guns, spray booths, pressure tanks, air compressors, exhaust fans, and other equipment for industrial spray finishing.

#### Cold-Drawn Steel

UNION DRAWN STEEL Co., 232 Harsh St., Massillon, Ohio. Bulletin entitled "Something New is Constantly Being Done with Union Cold-Drawn Steels," showing typical examples of the economies that can be effected by the use of cold-drawn steel.

#### Wood Screw Anchors

RAWLPLUG Co., INC., 98 Lafayette St., New York City. Booklet U-100, giving data on the construction, use, and advantages of the wood screw anchors known as "Rawlplugs." The booklet tells what size drill and Rawlplug to use with any size wood or lag screw.

#### Electric Switches and Motor Starters

COLT'S PATENT FIRE ARMS MFG. Co., Hartford, Conn. Catalogue 58-S, describing in detail the Colt-Noark industrial safety switches, meter service and entrance switches and a new line of motor starters.

#### Industrial Goggles and Shields

CHICAGO EYE SHIELD Co., 2300 Warren Blvd., Chicago, Ill. Bulletin listing this company's line of industrial head and eye protection equipment, including protective lenses, goggles, welding shields, respirators, sand-blast masks, helmets, etc.

#### Hoists

YALE & TOWNE MFG. Co., Philadelphia, Pa. Circular describing the outstanding features of construction and operation of the new Yale "Pul-Lift," which may be used in either a horizontal or vertical position for pulling or lifting.

#### Transmission Belting

MANHATTAN RUBBER MFG. DIVISION OF RAYBESTOS-MANHATTAN, INC., Passaic, N. J. Bulletin describing the Condor Whipcord endless transmission belting. Information is included on how to determine the length of endless belts, as well as horsepower tables.

#### Jig-Boring Machines

PRATT & WHITNEY Co., Hartford, Conn. Circular 412, containing a detailed description of the new P & W high-speed precision jig borer known as the No. 2A. Many examples of the use of this equipment are illustrated.

#### Conveying and Power Transmitting Machinery

PALMER-BEE Co., Detroit, Mich. Section 107 of general catalogue 100, containing data on P-B screw or spiral conveyor machinery for the elevating and conveying of material.

#### Plating Equipment

UDYLITE Co., 1651 E. Grand Blvd., Detroit, Mich. Circular illustrating and describing the new Udylite "Handiplater," with detachable cylinder, intended for occasional or production plating on small parts.

#### Reflectors for Vapor Lamp Lighting

MILLER Co., Meriden, Conn. Circulars illustrating and describing

Ivanhoe reflectors for high-intensity mercury vapor lamps intended for factory and industrial lighting.

#### Steam Drop-Hammers

CHAMBERSBURG ENGINEERING Co., Chambersburg, Pa. Bulletin 255, illustrating and describing the Chambersburg Model E steam drop-hammer. Complete dimensions are given for the various sizes.

#### Lubrication Equipment

ALEMITE CORPORATION, Chicago, Ill. 54-page manual on modern lubrication equipment, including information pertaining to Alemite fittings, lubrication guns and hose, and other accessories.

#### Drill Chucks

STANDARD TOOL Co., 6900 Central Ave., S. E., Cleveland, Ohio. Circular 4754, describing the features of the Standard improved drill chuck, especially designed to render long service.

#### Surfacing and Polishers

TRIMSON MFG. Co., P.O. Box 5547, Cleveland, Ohio. Leaflet descriptive of the operation and special features of the Trimson surfacer and polisher—a portable tool for sanding or grinding.

#### Oilless Bearings

SPADONE MACHINE Co., INC., 122 E. 25th St., New York City. Bulletin describing the method of construction of the Metaline oilless bearings and illustrating typical installations of these bearings.

#### Welding Equipment

LINCOLN ELECTRIC Co., Cleveland, Ohio. Application Sheet No. 44 in a series on machine design, describing the principles involved in redesigning a cast-iron shear for arc-welded construction.

#### Hot Plates

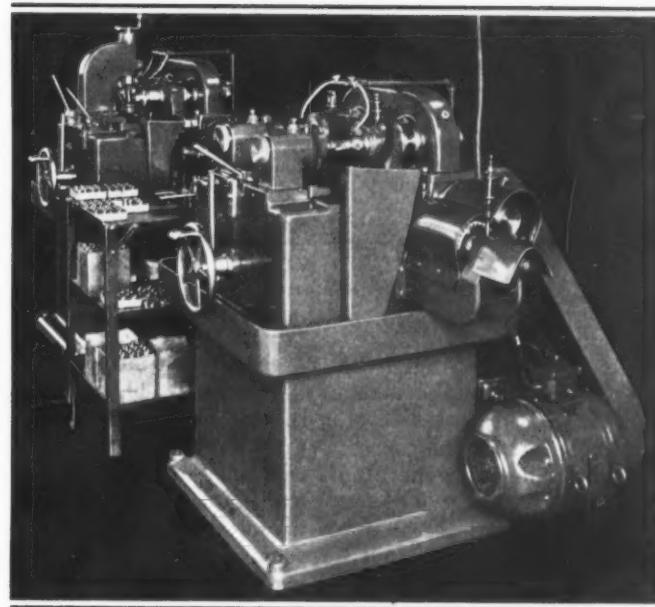
HEVI DUTY ELECTRIC Co., Milwaukee, Wis. Circular illustrating and describing the company's line of electric hot plates, especially intended for laboratory use.

#### Lubrication

IMPERIAL ELECTRIC Co., Akron, Ohio. Circular entitled "Lubrication of Bearings in Electrical Machinery," dealing with the care of ball and sleeve bearings.

# Shop Equipment News

*Machine Tools, Unit Mechanisms, Machine Parts, and Material-Handling Appliances Recently Placed on the Market*



## Equipment for Cutting, Lapping, and Testing Cone Worm-Gearing

The advantages of worm-gearing with teeth in surface, rather than line, contact have long been recognized; but the practical difficulties in accurately cutting such worm-gearing have prevented their broad application. The Michigan Tool Co., Detroit, Mich., has now developed manufacturing methods and a line of equipment for the production of area-contact worm-gears known as Cone gears after their inventor, Samuel I. Cone. The development of production methods and equipment for making such gears in any sizes, ratios, and quantities, is based on the recognition of the fact that no cutting of the final tooth form must take place except with the hob and work-piece on the same centers as those of the worm and wheel when assembled in service.

For cutting the teeth on Cone worm-wheels, hobs are used that are identical in form with the mating worm, except that the teeth are thinner in cross-section. The hob first cuts grooves in the wheel blank by feeding the cen-

ters of the work-piece and cutter toward each other. This might be considered a roughing operation. The groove thus cut is materially narrower than required when the wheel teeth are finished, but, on the other hand, no material has been cut away from the blank that should be left on for a final correct tooth form. In other words, the cutting away of stock due to "interference" has been confined to that part of the stock which eventually would have to be removed anyway. The objective of this part of the operation, of course, is to bring the cutter and work-piece into proper axial relationship.

Having reached the correct depth of cut, the feed now becomes rotary. Either the hob or the work-piece is rotated slightly about its own axis (it being immaterial which), while both hob and work-piece are rotating on the machine. The feed thus is similar to the way in which the gear would take up its own backlash, if clearance space ex-

isted instead of stock to be removed. Stock removal to obtain the correct tooth form is thus obtained by "shaving" the material in layers off the tooth or thread flanks until the final tooth form and dimensions are reached. On machines equipped with single hobs, the hob is fed angularly or rotated in one direction to face one tooth flank, and the feed is reversed to finish the flank on the other side of the groove.

The reason that both correct tooth form for surface contact and correct tooth dimensions can be obtained simultaneously is to be found in the tooth form. In Cone gearing, the flanks of both the thread on the worm and the teeth on the wheel, are straight lines when a plane is passed through the axis of the worm. All these lines, moreover, are tangent to a circle about the axis of the worm-wheel, the diameter of the circle depending on the desired pressure angle, etc. On the hobs, while the cutting teeth are thinner, they also have straight-line flanks in section,

## SHOP EQUIPMENT SECTION

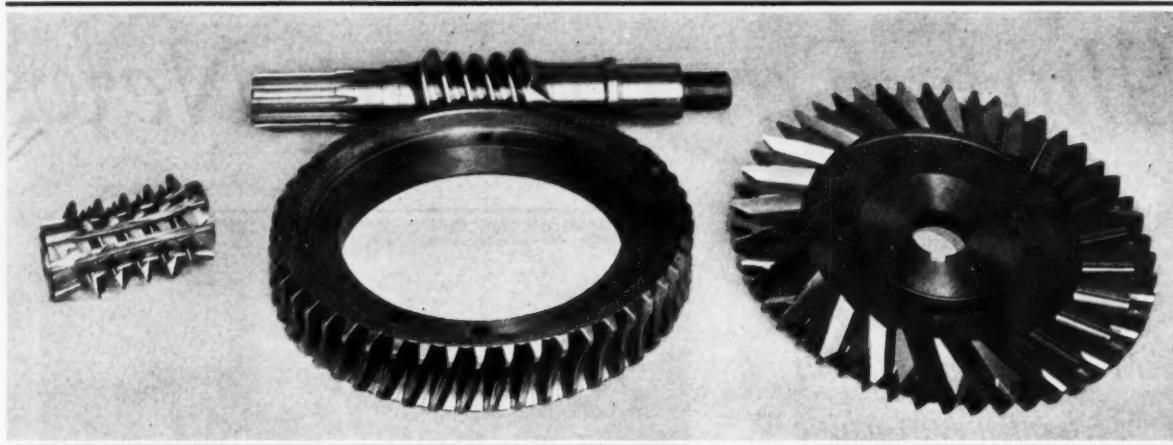


Fig. 1. A Set of Cone Worm-gears with the Hobs Used to Produce the Gear and Worm

and these are made tangent to a circle of exactly the same diameter.

It is thus seen that the correct tooth form will be generated automatically, irrespective of the thickness of the teeth on the hob or the amount of stock being removed in finishing. Furthermore, the hob can be reground time and again, as long as the flanks are ground tangent to the same base circle.

For large-scale production, machinery has been developed employing two hobs per work-piece

(see illustration on the preceding page). These are fed into the work-piece simultaneously, until correct center distances are reached—one on either side of the blank. Then one is rotated in one direction to cut the tooth form on the "front" of the teeth, while the other is rotated in the opposite direction to form the flanks on the "back" of the teeth. Production rates as high as 270 sets of gears per hour per operator have been attained.

For very small production of highly specialized gearing, meth-

ods have also been developed whereby a single cutter, instead of a hob, can be used to produce the worm or wheel, thereby eliminating the hob cost.

Since the hobbing methods for worm and wheel are identical, the same machine can be used for hobbing both (see Fig. 2). After the worm is generated, it is removed and replaced by a hob to form the teeth on the wheel blank, the latter being mounted in place of the identically shaped cutter that hobbed the worm.

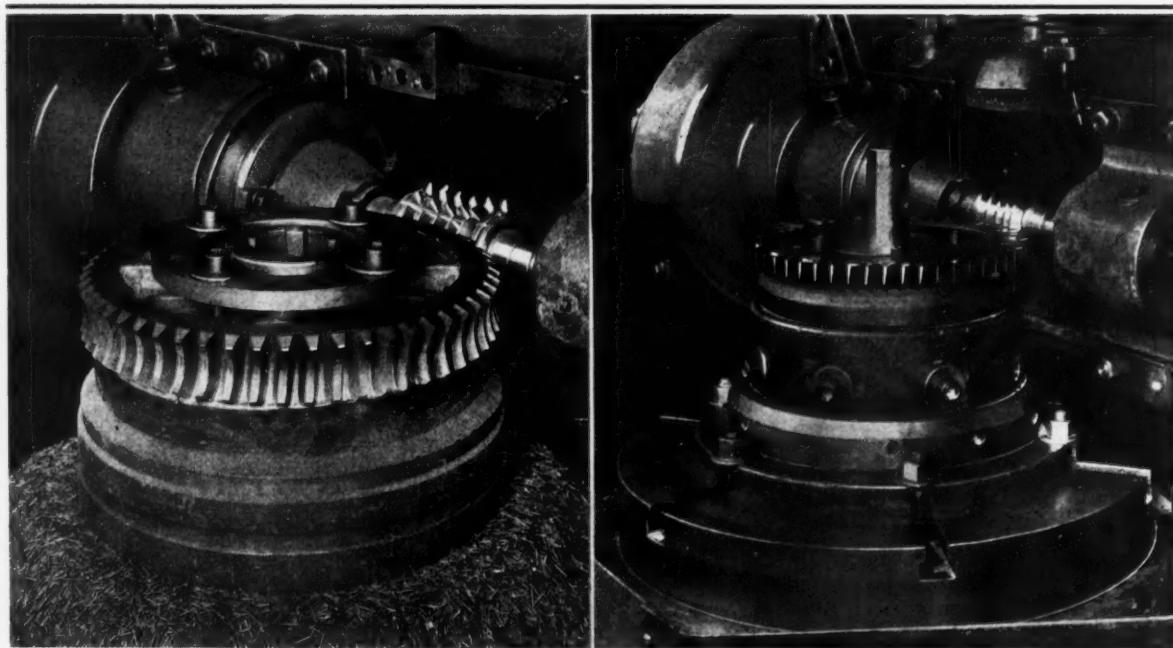


Fig. 2. The Same Machine can be Used to Produce Worm and Worm-wheel Interchangeably. To the Left, the Worm-wheel Teeth are Being Hobbed; to the Right, the Worm Thread

## SHOP EQUIPMENT SECTION

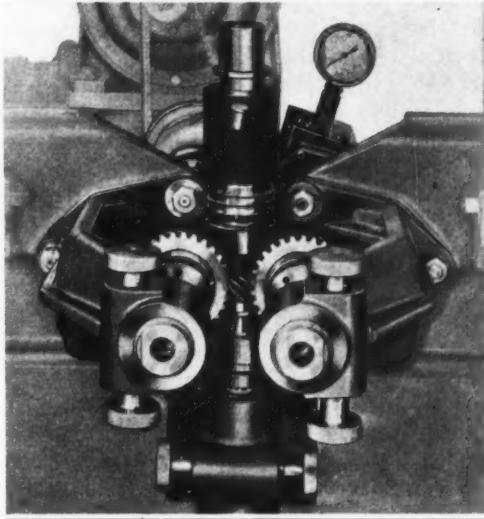


Fig. 3. Lapping Machine for Producing Very Quiet Worms and Worm-wheels

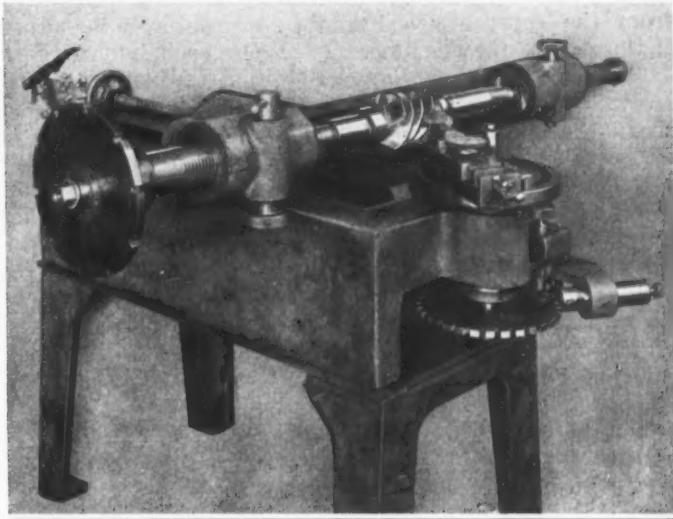


Fig. 4. Testing Machine for Checking Lead, Pressure Angle, and Spacing of Worm Threads

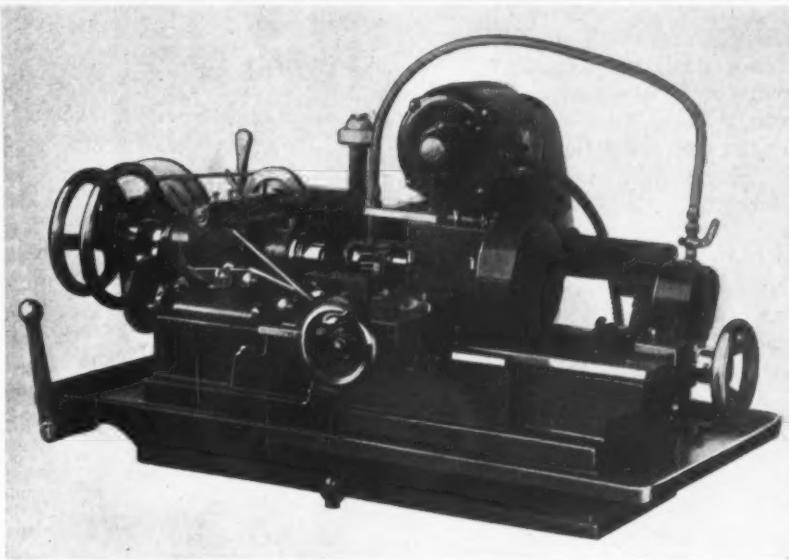
The wearing-in of the gears in service will automatically remove minor inaccuracies; but where extreme quietness is essential, these small inequalities can be removed before assembling the gears with a lapping machine, Fig. 3, designed for the purpose. In this machine, the "lapper" at the left drives the worm in the center, lapping one side of the worm thread; the worm, in turn, drives the "lapper" at the right, lapping the opposite face of the worm thread. The load is applied to the lap at the right and is adjustable to suit varying conditions. The same machine can be employed for lapping the worm-wheels by using two worm laps.

Cone worm-gearing is already widely applied in practice at speeds ranging from 1 revolution every fifteen minutes to 30,000 revolutions per minute. Gear ratios in use range from a 1 to 1 ratio for gears 1 inch in diameter, to 100 to 1 on gears 6 feet in diameter. An automotive manufacturer reports 40,000,000 miles of service on 3000 cars equipped with Cone worm-gears without a single failure or replacement for wear. One of the largest industrial companies in the country specifies that all new machine tools that it purchases shall be equipped with Cone main drive worm-gears.

### Waltham Thread Milling Machine

The thread milling machine built by the Waltham Machine Works, Newton St., Waltham, Mass., has been provided with special equipment designed for manufacturing purposes. This newly equipped machine has two motors instead of one as in previous models. The motor for driving the work is mounted at the rear of the machine base. The other motor is mounted on the cutter-spindle head, as shown

in the illustration. This motor drives the cutter-spindle by either a V-belt or a silent chain connected directly to the worm-shaft that drives the cutter-spindle. This arrangement, together with a heavier cutter-spindle, has increased the capacity of the machine so that a multiple cutter 1 inch wide can be used. It also eliminates the universal joint and connecting gearing by which the cutter-



Waltham Thread Milling Machine Equipped with Separate Motor Drive for Cutter-spindle

## SHOP EQUIPMENT SECTION

spindle was previously driven from the constant-speed motor at the rear of the machine.

By removing the carriage lead-screw and substituting a cam-shaft, the machine can be made to operate more nearly as an automatic on multiple-cutter work. This is achieved by having the camshaft control the pitch of the thread and also the feed-in and withdrawal movements for the cutter, as well as the return of the carriage to the starting position before the machine is stopped. The equipment shown is for multiple-cutter work, and has no provision for swiveling the cutter-head. Another cutter-head that can be swiveled to the correct helix angle for use with single cutters can be used in place of the one shown.

A lead-screw can be used in place of the camshaft for cutting long threads. The machine is arranged so that the cutter, cam-shaft, and work-spindle can be stopped simultaneously. Although it can be used as a bench machine, it is preferable that this thread milling machine be mounted on a cabinet base to form a self-contained floor unit.

### Trimming and Upsetting Press for Test Pieces

A trimming and upsetting press for test pieces designed to operate at 65 strokes per minute has been built by the Cleveland Punch & Shear Works Co., Cleveland, Ohio. The test pieces are first cut to the proper length on the side shear, which has full-hole shear blades and adjustable back gages.

After being cut, the pieces are set on end under the inner slide, where they are securely held in an upright position for upsetting by means of a magnetic block which can be readily adjusted for

various sizes of test pieces. This magnet can be adjusted to the proper height with the aid of a dial adjustment graduated to 0.001 inch. A positive lock is also provided for holding the adjustment securely when the proper setting is obtained. Safety devices protect the operator. Presses of this type can be furnished in a wide range of sizes and capacities and with various types of drives.

other projecting parts that might catch or tear the material or work has been brought out by the Stackbin Corporation, Providence, R. I. The box is 33 inches long, 19 inches wide and 23 inches deep.

The sides are constructed of 20-gage sheet steel and the top is reinforced with a channel steel bar that extends entirely around the box under the rolled top. The bottom is of 18-gage sheet steel welded to the heavy gage channel steel chassis. The chassis has two 3-inch swivel casters and two 4-inch stationary casters. The finish is battleship-gray, baked-on synthetic enamel. Any size truck of the same construction can be supplied.

### Stackbin All-Steel Box Truck

An all-steel box truck with smooth surfaces on the inside that have no rivets, bolts, or

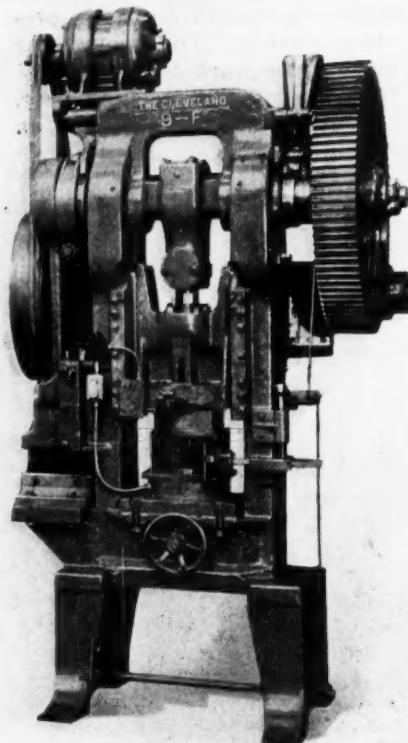
### Federal "Oil Spot" Welder with Hydraulically Actuated Electrodes

The "Oil Spot" welder recently developed by the Federal Machine & Welder Co., Warren, Ohio, differs from other spot-

welders in that the electrodes are brought into contact with the work automatically and in sequence by small hydraulic cylinders.

These cylinders are operated by a patented valve. In the case of the machine illustrated, the operator touches the foot-lever causing the entire work-holding member to rise to a stop, whereupon the patented valve goes through its cycle, bringing each of the forty-eight electrodes into contact with the work in proper sequence within ten seconds time. The part welded is a truck seat pan, composed of eleven separate pieces which are quickly placed in the assembly jig and welded into what is virtually one piece.

One of these machines has been constructed with a series of electrodes arranged in a straight line for use in a strip mill. The strip stock runs constantly under these

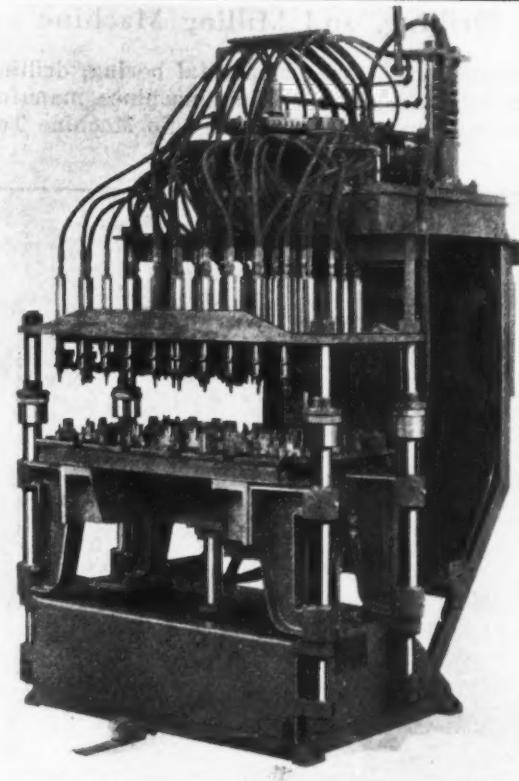


Cleveland Press for Trimming and Upsetting Test Pieces

## SHOP EQUIPMENT SECTION

electrodes; but when an end is reached and it is desired to join it to another strip, it requires but a few seconds to lap the ends of the pieces together under the electrodes and weld them by depressing the foot control. In this operation, the individual spot-welds begin at the center and alternately work toward the outer edges.

The floor of a well-known automobile, which is approximately 8 feet long by 5 feet wide and made up of six 18-gage steel members, is also welded in one operation on one of these machines. In this operation, a total of 250 spot-welds is made. Another adaptation of the "Oil Spot" welder principle has been made in welding complete automobile frame assemblies constructed of material as heavy as 14 gage. What really amounts to four machines are required for this job, which consists of joining two side members and three cross and central members with a total of 465 spot-welds.



Federal Welder that Brings Forty-eight Electrodes in Contact with the Work in Ten Seconds

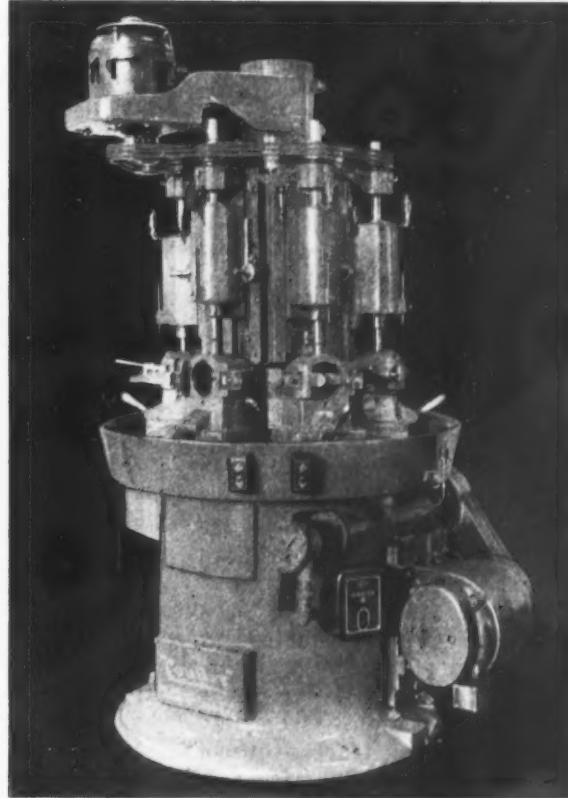
### Coulter Multi-Spindle Continuous Diamond-Tool Boring Machine

A Coulter diamond-tool boring machine of the vertical, six-station, revolving turret type is announced by the Automatic Machine Co., Bridgeport, Conn. This machine is designed for machining bearing holes in connecting-rods, pistons, bushings, valves, refrigerator units, motor end-shields, magneto housings, and similar parts required in large quantities. The machine illustrated is arranged for diamond-boring the wrist-pin holes in pistons. The fixtures are of the manually operated type equipped with locators, clamps, and ejectors. The operator unloads and loads the fixtures as they come to the idle-spindle position.

All the boring-spindle sheaves are driven from the motor spindle by means of V-belts as shown. As the turret revolves, the sheaves leaving the finished work position gradually move out of contact with the V-belts. A

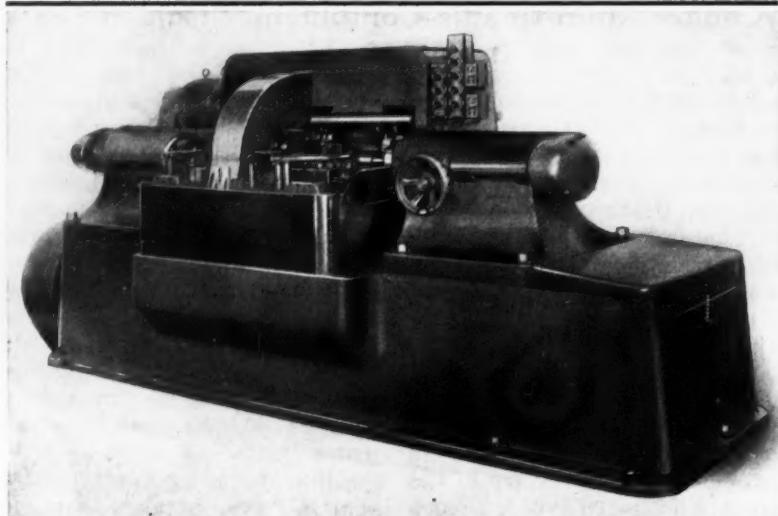
cam-operated friction brake then comes into operation, stopping the spindle before it reaches the unloading station. As the spindle leaves the loading position, it again comes in contact with the V-belts and is revolving when it reaches the first machining position.

The power for operating the turret and the lubricating and coolant pumps is transmitted through V-belts from another motor located at the base of the machine to a horizontal worm-shaft. Power is taken from one end of this worm-shaft for driving the pump. An annular distributor in the base of the machine directs the coolant to the tools, stopping the flow automatically at the loading position. The spindle speed is 4000 revolutions per minute; the turret speed, 1 1/2 revolutions per minute; and the production, nine bored pistons per minute.



Coulter Type B-131 Boring Machine Equipped for Diamond-boring Wrist-pin Holes in Pistons

## SHOP EQUIPMENT SECTION



Wickes Automatic Lathe for Machining 4-, 6-, and 8-throw Crankshafts

### Automatic Center-Drive Crankshaft Lathe

An automatic center-drive crankshaft lathe developed by Wickes Brothers, Saginaw, Mich., is here illustrated. This Model C lathe is designed for machining the cheeks, turning and filleting all the main line bearings, turning and shouldering the stub end of the crank, turning and straddle-facing the flange, and turning the oil-groove complete on 4-, 6-, and 8-throw crankshafts having three, four, or five main line bearings. The crankshaft is mounted on centers and is driven by means of a chuck which securely clamps the crank-arm adjacent to the center main bearing. This chuck, mounted in the center drive gear, not only drives but also holds the crankshaft in accurate alignment during the machining operation. The front tools are mounted on the front cross-slides in the conventional manner, while the rear tools are mounted on inverted cross-slides that are carried in the rear tool housing.

The machine is started by means of an electric push-button. The work cycle, consisting of the following operations, is entirely automatic: Rapid traverse of tool to cutting position; coarse facing feed; fine turning feed; stop at required diameter; dwell, permitting the crankshaft to revolve six or eight revolutions while the

cutting tools are held at the finished diameter in order to clean up the cut; stop lathe in unloading position; and rapid traverse

of the tools to the unloading position.

Electric "jogging" buttons are provided to permit the main drive gear of the tools to be brought into any position desired when setting up the machine. Automatic forced-feed lubrication is provided throughout the entire machine. The main drive is by means of a 25-horsepower motor through multiple V-belts.

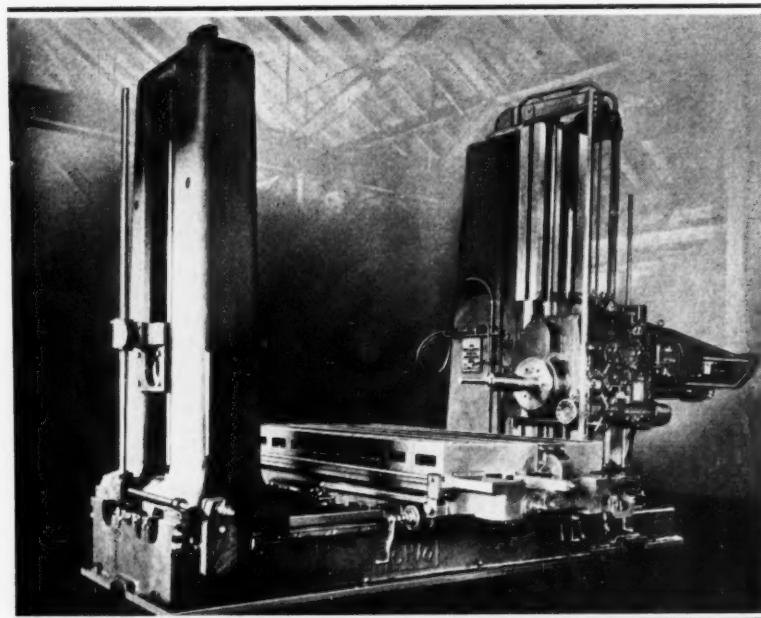
### Gilmer Oil-Resisting Belt

A belt made in both vee and flat "Kable Kord" types that is claimed to be remarkably oil-resistant is announced by the L. H. Gilmer Co., Tacony, Philadelphia, Pa. Mechanically this belt has the same qualities as the regular Gilmer rubber-fabric belt, but it is practically impervious to the destructive effect of oil. Records show that these belts have been run for long periods immersed in oil without any injurious effect.

### Ohio Boring, Drilling, and Milling Machine

Important improvements have been made in the 5-inch and 6-inch spindle Dreadnaught table

type, horizontal boring, drilling, and milling machines manufactured by the Ohio Machine Tool



Ohio Table Type Boring, Drilling, and Milling Machine of Improved Design

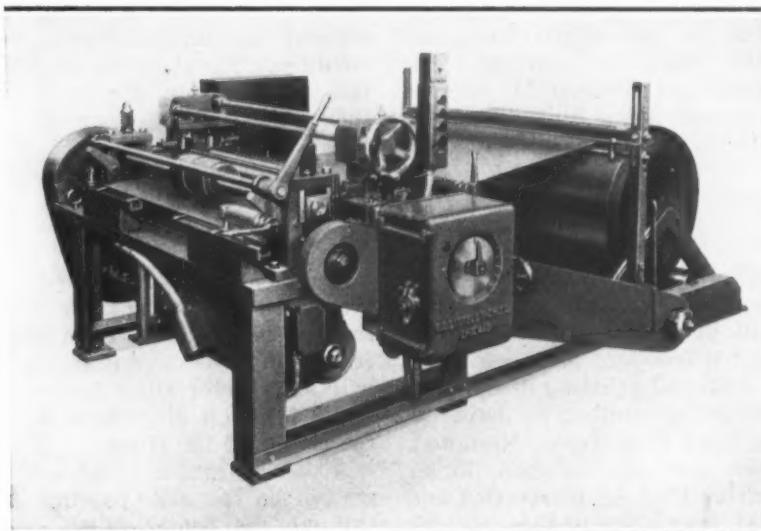
## SHOP EQUIPMENT SECTION

Co., Kenton, Ohio, and distributed by the Bryant Machinery and Engineering Co., 400 W. Madison St., Chicago, Ill. The illustration shows a 6-inch spindle machine which has a 72-inch vertical travel of the spindle head, a table 48 by 108 inches, and a bed 60 inches wide by 120 inches long. It is equipped with a quick-change-gear thread-chasing attachment for all threads between 2 and 28 threads per inch, including pipe threads. The machine is provided with a precision rod measuring attachment and a cutter coolant system. It weighs 80,000 pounds, and is installed at the plant of the Cleveland Punch & Shear Works, Cleveland, Ohio.

In this improved machine, the precision rod measuring attachment has been moved from the rear of the head and the rear of the table to the front of the head and to the front of the table, bringing it into position for easy manipulation by the operator from his regular position. The handwheel for obtaining the hand feed to the spindle and other units is brought to the extreme front of the machine, adjacent to the rapid hand adjustment to the spindle and power rapid traverse control.

The hand movement control to the table and table saddle and the clamping of the table to the saddle and of the saddle to the bed have also been brought to the front part of the saddle, adjacent to the operator's position. The boring-bar support bearing is fully counterbalanced and can be clamped from the floor, regardless of its vertical position. The head of the machine is oiled by a force-feed lubricating system, the oil being pumped through a Purolator and cleaner before it reaches any of the bearings or gears. The table and the table saddle are lubricated by a Farval one-shot oiling system.

There are thirty-six spindle speeds and sixteen drilling, boring, and milling feeds. The machine is designed for a 50-horsepower motor. Power rapid traverse, selective in type, is furnished to all units, including the spindle. The machine is built in both table and floor types.



Littell Straightening and Feeding Machine for Coiled Stock  
48 Inches Wide

### Feeding and Straightening Machine for Wide Coiled Stock

Practically all large blanks have previously been cut from sheet stock, but by using coiled stock a tremendous saving in the cost of blanks can be obtained. With this new system, now coming into use, two blanks are usually cut at a time, a staggered arrangement of the dies being employed. There is no waste at the end of each sheet, and handling costs are reduced.

The F. J. Littell Machine Co., 4127 Ravenswood Ave., Chicago, Ill., has brought out the motor-driven machine here shown for straightening coiled stock used in the production of automobile bodies and fenders and for feeding it into the blanking press. This machine has a patented power-driven reel for feeding wide stock. The feed can be changed to any length desired in a few minutes. The control panel, as well as the device for obtaining various feeding lengths, is mounted on the machine. The complete machine is portable and can be moved with a crane to the press used for blanking. The only connection of the feeding machine with the press is an electrical one. When the press cuts a blank and the press slide starts upward, the feeding machine automatically starts and

feeds the stock forward the proper length through a five-roll power-driven stock straightener.

A hand starting button, a stopping button, a button for "inching" forward, and a button for "inching" back are provided, so that the stock is always under control. The machine shown handles stock 48 inches wide by 0.040 inch thick in coils weighing up to 5000 pounds.

### Small Motor Starter Provides Protection Against Overloads

A Bulletin 9101 push-button starter recently brought out by Cutler-Hammer, Inc., 264 N. 12th St., Milwaukee, Wis., can be used for almost any fractional horsepower application. It provides protection against overloads through a free-tripping thermal overload mechanism, an overload being instantly indicated by the return of the operating button to the off position. The overload mechanism is reset and the motor started by simply pushing the starting button.

The capacity of the switch can be varied to provide protection for different sizes of motors by

## SHOP EQUIPMENT SECTION

is readily accessible from the front of the switch when the cover plate is removed. The switch can be used for surface mounting, as a built-in control with a self-contained mounting

bracket for front mounting, or without the bracket for cavity mounting. The complete mechanism is housed in an insulating shell.

the collector rings. The brush unit is shown to the right of the small chuck. To the left of the small chuck are shown the eyebolts used in lifting the large chuck. The bronze-copper plate in the chuck center can be removed to give access to the brushes and electrical connections.

Since this chuck was put in operation, a second chuck of identical design but only 46 inches in diameter has been supplied for the same company. These two chucks are used in grinding the inner and outer races of large roller bearings having outside diameters ranging up to a maximum of 66 inches.

### Walker 66-Inch Rotary Magnetic Chuck

The 66-inch magnetic chuck shown in the illustration was built by the O. S. Walker Co., Inc., Worcester, Mass., for use on a special grinding machine of the boring mill type built by the Niles Tool Works, Hamilton, Ohio, for the Timken Roller Bearing Co. An illustration and brief description of this machine appeared in June MACHINERY, page 627.

Some idea of the size of the chuck is obtained by comparing it with the standard 6-inch chuck shown in the foreground of the accompanying illustration. The chuck weighs about 5500 pounds and requires 2300 watts for its operation. A steel forging is used for the body which is recessed to receive the six coils. The two outside coils are wound on insulated steel spools to facilitate handling and also to secure maximum core section.

The top plate is a radial-pole type made from steel castings and is attached to the body by screws. A wide variety of auxiliary rings is used with this chuck. A series of drilled and

tapped holes in the chuck face is provided for securing these rings in place with screws. Lead wires from the coils terminate in a pair of collector rings located in the 7 1/2-inch diameter hole at the center of the chuck.

A pair of carbon brushes supported on a post passing up through the center of the machine table carry the current to

### Pratt & Whitney Tilting Table for Jig Borer

The tilting rotary table here illustrated has been designed by the Pratt & Whitney Co., Hartford, Conn., for use with the jig boring machine shown on page 27. This table permits the precision-boring of holes to correct angles, as well as the boring of work of a circular nature, which is most easily laid out by using polar coordinates.

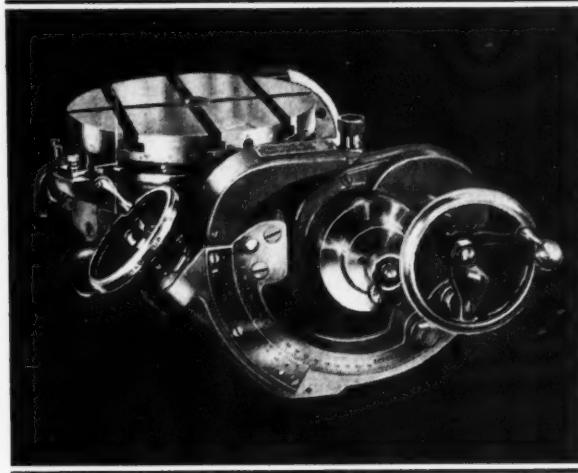
The scraped surface of the table is 10 inches in diameter. Standard work-holding slots are provided, as well as an accurate hole in the center for locating work. The outer edge of the

table is graduated in degrees for approximate indexing by means of a large rapid-traverse hand-wheel. Exact settings are made by turning a slow-motion hand-wheel which is engaged by means of a clutch knob. The larger graduated dial and its vernier make indexing possible within an accuracy of 2 seconds.

The entire table is hinged at one side and can be tilted to any angle from 0 to 90 degrees. Graduations and a vernier provide for setting to tilted positions within an accuracy of 1 minute. The table height in the



Walker 66-inch Magnetic Chuck Used in Grinding Operations on Timken Bearings



Tilting Rotary Table for Pratt & Whitney Jig Boring Machine

## SHOP EQUIPMENT SECTION

horizontal position is 6 1/8 inches. The net weight of the table is approximately 200 pounds. Equipment furnished

with the table includes a proving bar, chart, gage for angular setting, and either hold-down straps or T-bolts.

### Brown Air-Operated Controllers

On its seventy-fifth anniversary, the Brown Instrument Co., Wayne and Roberts Ave., Philadelphia, Pa., announces a new and complete line of recording and indicating air-operated controllers for temperature, flow, pressure, and liquid level. These controllers have been designed for use in the refining, chemical, food products, textile, and other industries. A feature is the facility with which adjustments can be made.

The Air-O-Line controller shown has a 1 to 150 per cent throttling range and an automatic reset. It will maintain a process at the control point within extremely close limits. The throttling range and automatic reset dials are instantly adjustable with a screwdriver without removing the chart plate.

Indicating and recording thermometer type temperature controllers are available for temperatures within limits of -40 degrees F. and +1200 degrees F. Potentiometer type controllers are available for temperatures within limits of -300 degrees F. and +3400 degrees F. The flow controllers and liquid level controllers are made in both the inductance bridge and mechani-

cal types. The characteristics of electric and air-operated control are combined. Indicating and recording pressure controllers are available in ranges

from 30 inches vacuum to 3000 pounds per square inch pressure.

Three other types of air-operated controllers are included in the new line. These are the "full throttler," a controller with 1 to 150 per cent throttling range and manual reset; the "throttler," a controller with 1 per cent to 10 per cent throttling range and manual reset; and an "on-off controller" for two-position service.

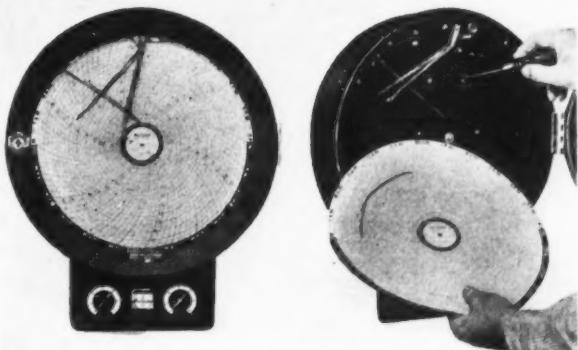
### Reeves Automatic Variable-Speed Ratchet Control

A ratchet control for automatic variable-speed regulation through the Reeves variable-speed transmission made by the Reeves Pulley Co., Columbus, Ind., is a recent development of this company. Although built for a special purpose, the principle is applicable to any requirement calling for a gradual increase or decrease in machine speeds over a specific period of time. The constant-speed shaft of the variable-speed transmission can be driven from any source of power, either motor, lineshaft, or engine. This shaft, in turn, drives a gear reducer of the proper ratio through a roller chain.

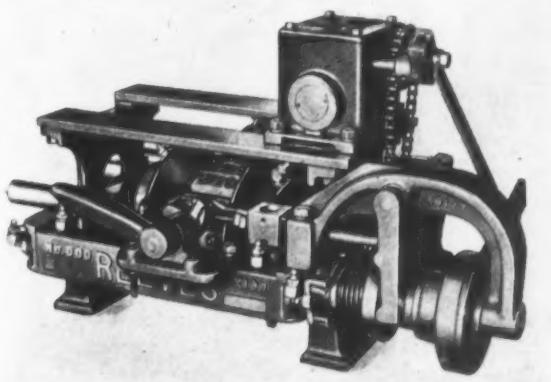
The output shaft is connected by an adjustable arm to the ratchet mounted on an extension of the speed-changing screw of the transmission. The adjustable

arm permits an increase or decrease in the timing of the control as required. Thus when the speed range required over the fixed period of time is known, the ratchet can be set so that the transmission begins the operation at either extreme speed, that is, at the point of maximum or minimum speed. The particular unit illustrated produces only 3 1/8 turns of the speed-changing screw in eleven hours, and provides for a variation in speed of from 196 to 279 revolutions per minute.

When the end of the run is reached, the transmission is shifted by hand back to the starting speed position, and the ratchet is reset by moving a lever. Stop-nuts on the screw at the right of the lever prevent the unit from over-running at the extreme speeds.



Brown Air-O-Line Controllers with Automatic Reset Arrangement



Reeves Ratchet Speed Control that Automatically Increases Speeds

## SHOP EQUIPMENT SECTION

### Machine with Cutting Torch Prepares Pipe Sections for Welding

A machine for cutting pipe, developed by Oster-Williams, 2057 E. 61st Place, Cleveland, Ohio, and designated the No. 212 automatically performs a task that heretofore could only be done by skilled hand labor. The new cutting machine automatically duplicates in design any kind of cut required in pipe welding work without the use of cams, templets, or special fixtures. The surfaces thus cut to shape have the appearance of having been finished with a lathe tool. The cutting torch is accurately guided by a mechanism that duplicates the motion of a torch held in the operator's hand. The machine will cut any size of pipe from 2 1/2 to 12 inches in diameter, making full size tees or 90-degree reducing tees, branch reducing tees of 45 to 90 degrees, elbows, miters, and Y's.

In appearance, the machine is somewhat similar to a radial drill press. The generating case, which is made of aluminum, is mounted on a rotating column which can be swung in any di-

rection and readily positioned at the end or side of the pipe for taking the required cuts. The pipe is placed on ball-bearing rollers housed in adjustable supports that rest on double rails mounted on the welded-steel base of the machine. A chart is furnished which guides the operator in setting the machine for any kind of cut required. For even the most difficult cut, it is only necessary to make five simple settings.

### Riveting Hammer for Heavy Work

To meet the demands for a machine capable of performing heavy cold riveting operations, the High Speed Hammer Co., Inc., 305-321 Norton St., Rochester, N. Y., has just brought out a No. 7B riveting hammer. This machine will cold-head 1 1/2-inch diameter mild steel rivets, forming oval heads in thirty seconds; and 3/4-inch diameter rivets in seven seconds each. In

the case of riveting flanges, work of a much greater diameter can be handled.

These hammers are also capable of performing many other swaging and forming operations. The machine has a horizontal gap of 15 1/2 inches and weighs approximately 5000 pounds.

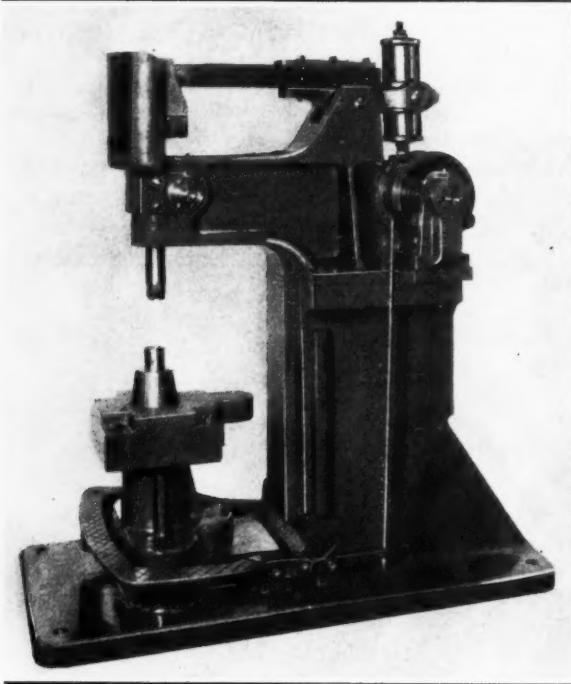
### Sentry Electric Furnace for Hardening High-Speed Steel

Small tools of high-speed steel can be hardened on a production basis or intermittently in an electric furnace being placed on the market by the Sentry Co., Foxboro, Mass. This furnace is particularly suited to hardening by the Diamond Block method developed by the concern. Quick heating, close temperature control, and temperature uniformity are some of the advantages claimed for this new furnace.

Operating temperatures up to 2500 degrees F. can be employed. Heating elements are provided above and below the muffle, and the normal life of the heating elements is approximately 800

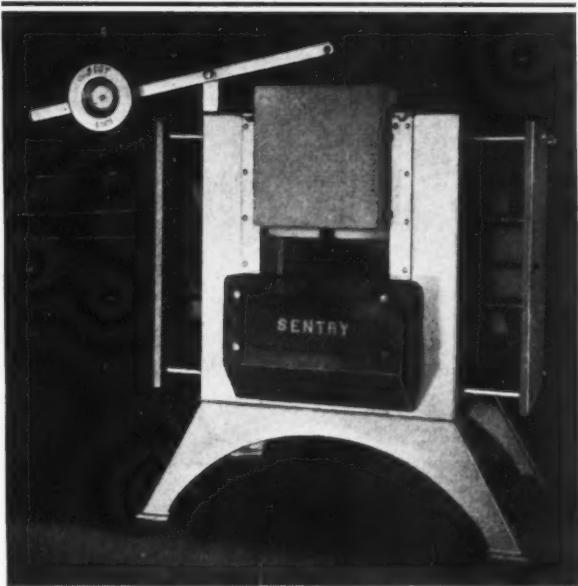


Oster-Williams Pipe Cutting Machine that Prepares Pipe for Welding into Tees, Elbows, etc.



Machine for Heavy Cold Riveting Built by the High Speed Hammer Co.

## SHOP EQUIPMENT SECTION



Electric Furnace for Hardening High-speed Steel Tools



Frew Automatic Spline Miller Equipped with Three Milling Units

hours. The air-cooled terminals eliminate the need of a cooling system. It is claimed that with reasonably new heating elements the furnace will heat from cold

to 2350 degrees F. in considerably less than an hour. The removable silicon-carbide muffle chamber is 4 1/2 inches wide, 2 inches high, and 9 inches deep.

### Hanson-Van Winkle-Munning Plating and Burnishing Equipment

A non-contaminating, corrosion-resisting coating for plating racks, a Mercil type centrifugal dryer for plated parts, and a Mercil type burnishing barrel are new products announced by the Hanson - Van Winkle - Munning Co., Matawan, N. J. The Kote-Rax covering for plating racks is applied by dipping. It covers the rack with a tough, rubber-like film possessing high dielectric resistance and capable of withstanding considerable mechanical abuse. Extensive tests indicate that it is not affected by immersion in the solutions commonly used in the baths for chromium, nickel, cadmium, zinc, copper, brass, silver, tin, and similar plating. In the average application the rack is dipped four times into the material at temperatures of 230 to 260 degrees F. It is of especial interest to note that it does not adhere to the metal, but holds its position by shrinkage.

Speed in drying basket loads of plated work and compactness of the equipment are features of the new Mercil type centrifugal dryer, which is available in two sizes—12 by 12 inches and 13 by 18 inches. Transferring the work is a simple operation and pieces to be dried may be placed directly in the perforated shell or a separate basket which fits into the shell. Power for driving the turntable at 600 revolutions per minute is obtained from a 1/2-horsepower motor through a pair of bevel gears. A conveniently located reversing switch allows the operator to control the direction of rotation at will.

The Mercil type burnishing barrel has the barrel, gearing, and motor combined in one unit. Provision is made for adjusting the barrel to any angle while running. In designing the barrel, the aim was to obtain quiet and efficient operation.

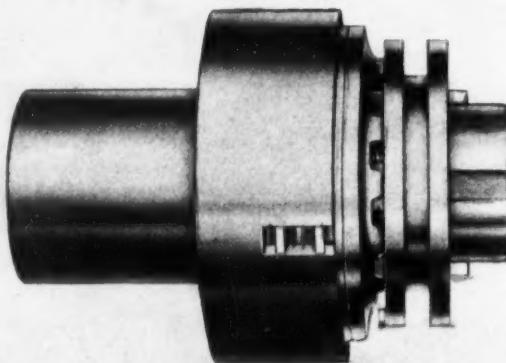
### Frew Automatic Spline Miller

An automatic spline milling machine has just been placed on the market by the Frew Machine Co., 132 W. Venango St., Philadelphia, Pa., which can be built with any number of units to meet production needs. The machine illustrated has an individual, direct-connected motor for each cutter-spindle, which operates at a speed of 7200 revolutions per minute, giving the correct surface speed for the end-milling cutters used on brass and soft steel. End-mills up to 1/4 inch in diameter are used. The length of the spline milled is controlled by an adjustable crank action which reciprocates the table.

On this size machine, the maximum stroke is 1 inch. Each head unit is controlled by a continuously rotating cam which has a dwell period to permit loading, a rapid advance to the work, a correctly proportioned depth feed to a maximum of 3/8 inch, and a quick return to the loading or dwell position. The depth of the spline is controlled by an adjustable cam follower.

The cams that actuate the cutter-head units are all mounted on one shaft and so positioned that each head performs its operation

## SHOP EQUIPMENT SECTION



Conway Clutch with Extended Sleeve for Mounting Drive Members

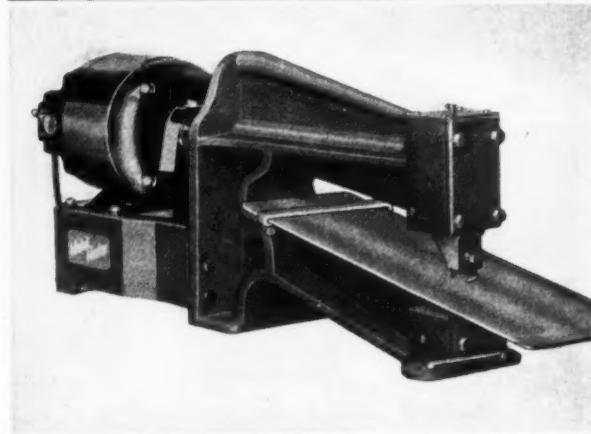


Fig. 1. Glascock Jig Shear Especially Suitable for Use in Model Making

in the proper sequence to facilitate unloading and reloading of the work. In the case of a machine having three units, a period of 7 seconds is allowed for loading time at each spindle. A brass part with a spline 1/8 inch wide, 5/16 inch deep, and 5/8 inch long is produced at the rate of 4 pieces per minute per spindle, or 12 pieces per minute for the machine shown, which is attended by one operator.

There are three positions of the spindle control levers shown in front of each unit. In one position, the cycle is continuous, while in the second position, the unit goes through one cycle and stops. The third position provides for stopping the spindle quickly at any point in the cycle.

### Conway Single- and Multiple-Plate Clutches

A line of clutches in three sizes having outside diameters of 5 5/8, 4 1/2, and 3 1/2 inches, with single plates for fractional horsepower and multiple plates for heavier drives, is announced by the Conway Clutch Co., 1547 Queen City Ave., Cincinnati, Ohio. The power transmitting range covered by these clutches is from 0.14 horsepower at 100 revolutions per minute for the smallest size up to 12 horsepower at 1000 revolutions per minute for the largest clutch.

These clutches can be operated

singly or doubly, or for forward and reverse drive, either dry or in oil. They are similar in design to the larger disk clutches made by this company, except that the angle of "actuation" has been adapted to conserve frictional area and strengthen the carrier. A set-screw or a set-screw and key is the only means necessary for attaching them to the shaft. The illustration shows the tandem plate clutch with an adapter cup on which can be mounted a gear or other means for power transmission. Shaft coupling types are also available.

The cutting blades are 1/8 by 5/8 inch, and are reversible. Adjustments are available for resharpening and taking up wear. The bottom blade holder drops below the surface of the table by a quick acting lever. This permits starting in the center of the sheet, taking interior cuts, or quickly backing out from a dead-end cut without stopping the shear. The shear will cut

### Glascock Shear and Welder

Equipment especially suitable for producing sample work in a manufacturing plant has been developed by the Glascock Bros. Mfg. Co., Muncie, Ind., in the form of a jig shear and a welder. In designing new products, the manufacturer is constantly confronted with the necessity of making models. The machines here described will perform this class of work without interfering with the production equipment.

The shear, shown in Fig. 1, has a 9-inch throat and a capacity to cut 16-gage U.S.S. materials and lighter. The stroke is 1/16 inch. The machine is driven by a direct-connected General Electric 1/4-horsepower motor.

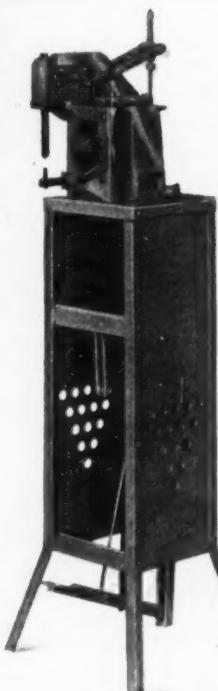


Fig. 2. Glascock Welder for Light Work

## SHOP EQUIPMENT SECTION

metal in a straight line, and has a slitting capacity of from 12 to 15 feet per minute without causing distortion.

The welder, shown in Fig. 2, has a General Electric two-heat transformer and heat radiating device and sensitive control switch of special design, adapting this small type of welder for a wide range of work. By virtue of its two-heat construction, it is capable of welding very light gage metal without burning. Three-sixteenths inch wire has been fused flush, and very light wire, about the diameter of a pin, has been tacked without burning through.

### Glenco Compensating Tool-Holder

A tool-holder designed to compensate automatically for machine spindle misalignment and thereby produce accurately tapped and reamed holes, has been added to the line of tools made



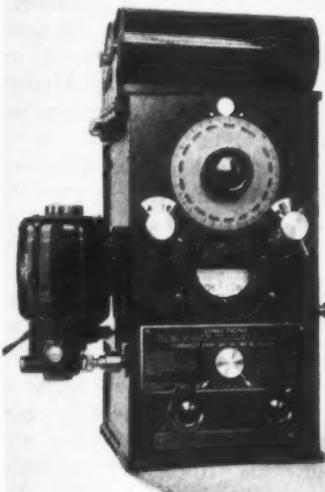
Tool-holder Designed to Compensate for Spindle Misalignment

by the J. C. Glenzer Co., 6463 Epworth Blvd., Detroit, Mich. These holders are available in five standard sizes with capacities for holding tools up to 5 inches in diameter. They are made in types to fit hand and automatic screw machines, Garvin tappers, adjustable multiple spindles, and drilling and tapping machines of all types. Special or larger holders than standard sizes can be made to order.

Only eleven different parts are used in this type of holder. The parts are held to close tolerances and are interchangeable. All parts are hardened and ground.



A New Product of the Numberall Stamp & Tool Co.



Foxboro Controller Equipped with a Motor Drive

### Improved Motor Drive for Foxboro Control Pyrometers

For installations where potentiometer control pyrometers made by the Foxboro Co., Foxboro, Mass., are to be used singly, the concern has developed an improved type of motor-driven unit called the Type H. The drive comprises a ball-bearing enclosed motor and a double worm-and-gear speed reducing system packed in lubricant.

In addition to its availability for single-controller installations, this drive has ample power for operating one additional controller by means of a coupling.

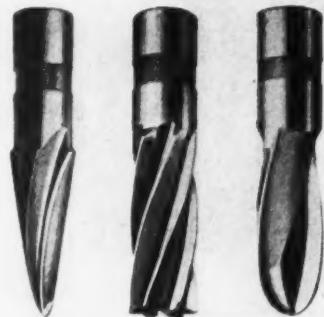
### Platform Type Numbering Machine

Brass tool checks, machine number plates, and all other similar small checks or plates can be quickly stamped with letters or figures by using the platform type numbering machine shown in the illustration. This hand-operated machine is a product of the Numberall Stamp & Tool Co., Inc., 379 Huguenot Ave., Huguenot Park, Staten Island, New York.

The platform is 4 by 4 inches in size, and is equipped with flanges, so that it can be bolted in place on a bench if necessary. The "stamp" slides vertically in a substantial bearing, and carries three, four, five or six wheels. The stamp is held in position by a spring, and when in use, is pressed down by hand until it rests on the plate or check. It is then struck a light blow with a hammer, making the desired impression in the material. The stamp-holding arm works on a hinge, and can be lifted to facilitate changing the numbers.

The platform is equipped with a graduated adjustable guide and set-screw to enable the operator to locate the plates or tags with speed and precision. The stamp can be removed from the holder when required for use as a hand stamp for stamping machines and other large objects. Figures or letters can be supplied in sizes from 1/16 to 1/4 inch.

## SHOP EQUIPMENT SECTION



High-speed Die-sinking Cutters

### Pratt & Whitney Die-Sinking Cutters Designed for High Speed

Three new die-sinking cutters for use at spindle speeds up to 3600 revolutions per minute in tough steels have just been brought out by the Pratt & Whitney Co., Hartford, Conn. These cutters are known as ball-end, square-end, and 7-degree taper cutters. All of them are regularly furnished with right-hand spiral flutes.

The ball-end cutters and the square-end cutters are available in thirteen sizes ranging from  $1/8$  to  $1 \frac{1}{4}$  inches in diameter, inclusive. The shank diameters are the same as the diameter of the cutting portions, except in the case of the two smallest sizes, which have  $1/4$ -inch shanks.

The 7-degree taper cutters are available in twelve sizes ranging from  $1/8$  to  $1/2$  inch, inclusive. This nominal size designates the diameter of the small spherical end. The 7-degree taper is on one side, the included angle being 14 degrees. This type of cutter can be used for both roughing and finishing opera-

tions, and can also be supplied as a roughing cutter only, with nicked or gashed teeth.

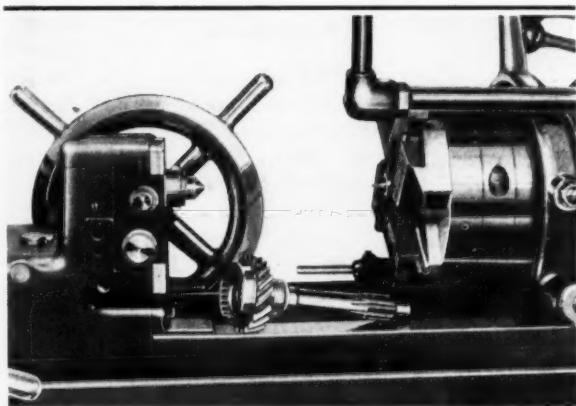
These three cutters are designed primarily for use with the Pratt & Whitney universal die-sinker which takes both cherrying and straight die-sinking cuts. Special cherrying cutters are not required for finishing round cavities.

moves the carriage forward, the center moves back into the bore of the head. The center operates in a hardened and ground bushing. The work-holding and driving mandrel is applied to a standard carriage or vise and can be readily removed. The attachment shown can be modified to suit other operating conditions.

### Attachment for Landmaco Threading Machine

A work-holding and centering attachment for use on the Landmaco threading machines has been developed by the Landis Machine Co., Inc., Waynesboro, Pa. The accompanying illustration shows this attachment arranged for holding automobile clutch gears for the threading operation. On this job, it is necessary that the thread be concentric with the gear. This requirement is met by providing a live center that is supported in the die-head. The gear is not rigidly clamped for the threading operation, but is placed by hand over the mandrel. It is driven by lugs on the mandrel which engage the internal gear. The mandrel has a hardened and ground locating surface that lines up the gear properly for the threading operation.

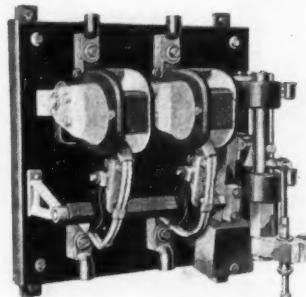
The live center which extends slightly beyond the face of the die-head is placed under spring pressure, so that as the operator



Landmaco Threading Machine Equipped for Threading Automobile Clutch Gears

### Clark Air-Operated Spot Welder Control

A controlling device for spot welders, consisting of an air-operated contactor connected directly to the welder-head air



Clark Controlling Device for Spot Welders

cylinder, has been developed by the Clark Controller Co., 1146 E. 152nd St., Cleveland, Ohio. This arrangement permits the device to be operated from the built-up back pressure of the welder cylinder, thereby eliminating the need for any kind of pressure switch or back-pressure relay.

The air-operated contactor cannot close until the welder points have come together on the work to be welded, even though no pressure device is used. The air-operated contactor is so designed that one stroke of the piston both closes and opens the contacts of

## SHOP EQUIPMENT SECTION

the electric welder circuit. It is claimed that this feature eliminates the need for any timing relay. Accurate timing as low as 1/2 cycle is obtained. Reports from several hundred of these air-operated contactors that have been in service for about three months have shown practically no cost for upkeep.

### Device for Indicating Machine and Bearing Temperatures

A small industrial thermometer of the bi-metallic type that can be easily attached to motors,



"Tel-Temp"—a Device that Shows Bearing Temperatures

generators, and other machines, for determining operating temperatures at a glance has been developed by the Ideal Commutator Dresser Co., 1825 Park Ave., Sycamore, Ill. This device is known as the "Tel-Temp." It consists of a dial plate mounted in a dustproof aluminum case, protected by a non-breakable crystal and chromium-plated cap.

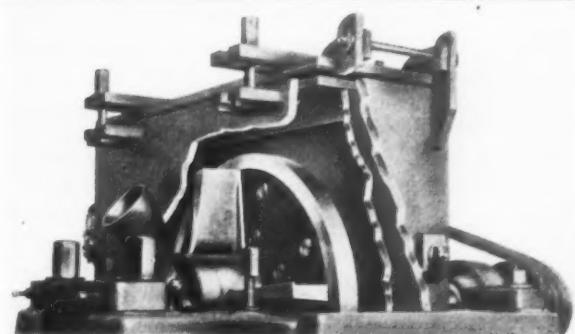
The dial gives temperature readings from 0 to 100 degrees C., (32 to 212 degrees F.) and the scale has a background of green, orange, and red indi-

cating safe, caution, and danger zones. The base has a threaded stud that screws into the case and is attached to the machine frame with escutcheon pins. This instrument can be installed on machines as a permanent heat indicator or used for the portable testing of any machine or bearing by having the required number of bases.

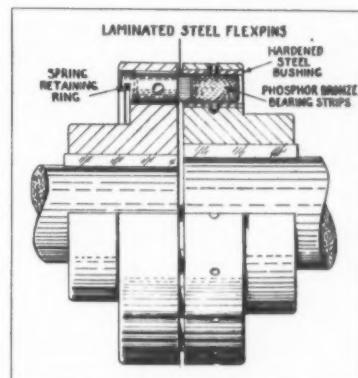
### Pangborn "Rotoblast" Cleaning Machine

The need for compressed air as the abrasive driving agent has been entirely eliminated in a new blast cleaning machine announced by the Pangborn Corporation, Hagerstown, Md. Instead of compressed air, a rapidly spinning wheel propels the abrasive by controlled centrifugal force. It is this feature that gives the new unit its name, "Rotoblast." This machine is adapted for all kinds of cleaning work. It is recommended for use with barrel blasts, table blasts, special cabinets, and similar equipment.

With this machine, loads of castings weighing 1800 pounds have been thoroughly cleaned in eight minutes. Eighteen cubic feet of gray iron, malleable iron, steel castings, forgings, stampings and heat-treated parts have been thoroughly cleaned in from eight to fifteen minutes. Low maintenance cost has been insured by making all parts exposed to blast action of abrasive resisting material.



Pangborn Abrasive Cleaning Machine of Centrifugal Type



Coupling with Laminated Steel Pins of Improved Design

### Smith and Serrell "Flexpin" Couplings

Increased power capacity, longer life, and greater protection for the connected machines against shaft misalignments, shocks, and vibrations are provided by improved "Flexpin" couplings recently developed by Smith & Serrell, 62 Washington St., Newark, N. J. These couplings are available in twenty-one regular sizes rated up to 4200 horsepower per 100 revolutions per minute and for shafts up to 13 1/4 inches in diameter. The "Flexpins" consist of a bundle of steel laminations, copper coated to resist rust, and held in a slotted keeper by hardened steel cross-pins which are welded in place. The sliding ends of the Flexpins are longer, and have greater area than formerly, and have thick phosphor-bronze bearing strips welded to the outside spring laminations.

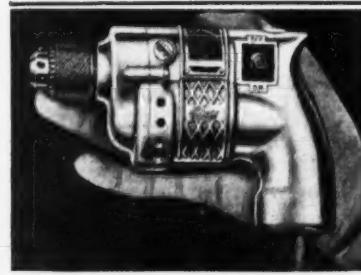
The Flexpins are held in place in one flange by a spring retaining ring, or by radial bolts in the case of the larger sizes. Hardened steel bushings with rectangular broached holes which receive the long sliding ends of the Flexpins are employed in the other flange. The bushings are locked in place in such a way that they can be easily removed and replaced after sev-

## SHOP EQUIPMENT SECTION

eral years of service if necessary. These improved Flexpins and hardened steel bushings can be employed in any bushed laminated pin type couplings made since 1925.

### Thor Electric Drill of Midget Proportions

A portable electric drill weighing only 2 1/2 pounds and only 6 3/4 inches long over all has just been introduced by the In-

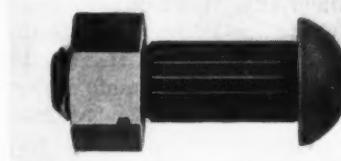


Portable Electric Drill Claimed to be Smallest Ever Built

dependent Pneumatic Tool Co., 600 W. Jackson Blvd., Chicago, Ill. This new Thor tool is made in two types—the U-14 having a free spindle speed of 2500 revolutions per minute and a capacity for drilling 1/4-inch holes; and the U-13 having a free spindle speed of 3750 revolutions per minute and a capacity for drilling 3/16-inch holes. The bearings, gears, and ventilating system of this portable tool have all been designed to reduce noise and vibration to a minimum and to give high motor efficiency.

### Structural Ribbed Bolt for Use with Anco-Nut

Ribbed bolts for use in the construction of buildings, bridges, tanks, towers, cars, etc., have been brought out by the Automatic Nut Co., Inc., Chrysler Bldg., New York City. These bolts are designed for use in conjunction with the Anco-nut of this company's manufacture, which



Structural Ribbed Bolt Brought out by the Automatic Nut Co.

has a self-contained locking feature.

The ribbed bolt has the Standard American Boiler Manufacturers' Association button head, the U. S. Standard threads, and is made in a wide range of sizes, in black or galvanized finish. The material is carbon manganese steel, having a tensile strength of 70,000 pounds per square inch. These bolts are simply driven into place and the nuts applied and tightened. The triangular ribs embed themselves in the wall of the hole in the work, making a tight fit.

### Standards for Surface Grinders of the Reciprocating Table Type

The Surface Grinder Group of the National Machine Tool Builders' Association has adopted the following standards for surface grinders of the reciprocating table type:

1. A definite form for specifications.

2. A definition for capacity. The capacity of a surface grinder of the reciprocating table type is the length of the table working surface by the width of the table working surface.

3. Length of table working surface of surface grinders of the reciprocating table type shall be confined to 18, 24, 36 inches and up, in increments of 12 inches.

4. Width of table working surface of surface grinders of the reciprocating table type shall be confined to 6, 8, 10, 12, 16, 20, and 24 inches.

5. The maximum transverse travel of surface grinders of the reciprocating table type shall be

not more than the standard width of table working surface plus width of standard wheel plus 1/2 inch.

6. The maximum longitudinal travel of surface grinders of the reciprocating type shall be not more than the length of table working surface plus half the diameter of the standard wheel plus 1 inch. No portion of the table provided for clamping devices is to be considered as part of the working surface.

7. The maximum distance from top of table to center of spindle on surface grinders of the horizontal-spindle reciprocating table type, shall be not greater than the following:

Working Surface Width, Inches	Vertical Distance to Center of Spindle, Inches
6	14 1/8
8	17 1/8
10	20 1/8
12	23 1/8
16	27 1/8
20	35 1/8

8. Wheel-hole sizes for surface grinders of the reciprocating table type shall be confined to 1 1/4, 2, 3, 5, and 8 inches.

Note: It is understood that all of these standards are applicable only when new designs are contemplated.

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### Philadelphians Charter Train to Show

Philadelphia machinery distributors, manufacturers, and engineers have chartered a special train for their visit to the National Machine Tool Show in Cleveland. The train will leave Philadelphia by the Pennsylvania Railroad, Monday evening, September 16, arriving in Cleveland the following morning. The visitors will stay in Cleveland for three days, leaving Cleveland, Thursday evening, September 19. They will use the train as living quarters during their stay in Cleveland where it will be conveniently parked in the Davenport yard.

# NEWS OF THE INDUSTRY

## Canada

MAJOR LAWRENCE LEE ANTHES, president of the Anthes Foundry, Ltd., Toronto and Winnipeg, Canada, has been awarded the John A. Penton gold medal by the American Foundrymen's Association in recognition of his "distinguished service to the foundry industry of America." The presentation was made during the convention of the Association in Toronto, Canada, August 19 to 23.

## Illinois and Indiana

OSCAR W. HEDSTROM PATTERN WORKS have purchased the one-story modern brick building located at 4836-42 W. Division St., Chicago, Ill. This firm started a small job shop in 1907, and since that time has continually developed its facilities and expanded its services. The company expects to move into its new quarters about October 1.

GENERAL MFG. CO., Detroit, Mich., has appointed JOHN M. DAVIE, 224 S. Michigan Ave., Chicago, Ill., exclusive representative for the company's flexible power presses and shaft-straightening attachments in the northern Indiana, Illinois, Wisconsin, and Iowa territory.

BANTAM BALL BEARING CO., South Bend, Ind., announces that the company has been awarded the contract for bearings for a new continuous hot strip mill being built at Gary, Ind.

## New York

HARRY S. BROWN was elected president of the Foster Wheeler Corporation, 165 Broadway, New York City, at a recent meeting of the board of directors. Mr. Brown succeeds his brother, J. J. BROWN, who has held the offices of chairman of the board and president for the last two years. J. J. Brown continues to serve as chairman of the board. At the same meeting, DAVID McCULLOCH, formerly secretary and general manager, was elected executive vice-president, and WALTER F. KEENAN, JR., GEORGE B. FERIER, and J. J. NELIS were elected vice-presidents. P. N. WENZ was elected secretary.

AIR REDUCTION SALES CO., Lincoln Bldg., 42nd St., New York City, has moved its Portland, Ore., branch from 3rd and Glisan Sts., to larger quarters at 13 N. W. Fourth Ave. The company also announces the establishment of new

headquarters at 336 Spring St., N. W., Atlanta, Ga., and at 18-20 N. Cheyenne Ave., Tulsa, Okla.

MATTHEW A. SMITH, of P. M. Mahler & Co., Inc., foreign sales managers, 80 Broad St., New York City, is planning to leave shortly on a trip to South Africa, Australia, and the Far Eastern countries as special foreign representative of his firm.

GEORGE J. KELLER, formerly western New York representative of the Jones & Lamson Machine Co., Springfield, Vt., is now associated with the R. L. Crane Machinery Co., 658 Ohio St., Buffalo, N. Y., as sales engineer.

## Ohio

APEX MACHINE & TOOL CO., 501 E. 3rd St., Dayton, Ohio, has recently acquired the SCHELLENBACH-HUNT TOOL CO. of Cincinnati, Ohio, and will continue to manufacture the Schellenbach-Hunt line of reamers in the Apex Co.'s plant in Dayton. The Schellenbach-Hunt Tool Co. was established in 1899 and its line of reamers is well known in the trade. The Apex Machine & Tool Co. has ample facilities for their manufacture and servicing. The reamers will be known in the future as the Apex S. & H. reamers.

TIMKEN STEEL & TUBE CO., Canton, Ohio, announces the election of Frank L. Gibbons as vice-president in charge of sales. Mr. Gibbons has been associated with the company as director of sales since 1932. He has been identified with the sales end of the steel business since 1908, having been with the Crucible Steel Co., the Carbon Steel Co., the Central Steel Co., the Central Alloy Co., and the Republic Steel Corporation.

R. B. NUCKOLS has been appointed assistant sales manager of the STANDARD TOOL CO., 6900 Central Ave., S. E., Cleveland, Ohio, manufacturer of drills, reamers, taps, and milling cutters. Mr. Nuckols will make his headquarters at the general offices in Cleveland. He has previously been located in St. Louis.

RELIANCE ELECTRIC & ENGINEERING CO., 1042 Ivanhoe Road, Cleveland, Ohio, at a recent meeting of the stockholders, elected J. W. COREY, sales manager, and S. B. TAYLOR, works manager, members of the board of directors.

PENINSULAR STEEL CO. announces the opening of a warehouse at 1915 Spielbusch Ave., Toledo, Ohio, where Bethle-

hem and Swedish tool and die steels and high-speed and alloy steels will be available. George E. Reminger is manager.

A. B. BOK, formerly special service and development engineer of the Cincinnati Milling Machine Co., Cincinnati, Ohio, has joined the Kent-Owens Machine Co., Toledo, Ohio. Mr. Bok will devote his efforts to milling machine problems and new machine developments.

## Pennsylvania

RICKERT-SHAFER CO., Erie, Pa., manufacturer of machinery and tools, elected the following officers at the last stockholders' meeting: GEORGE E. SHAFER, president; CLINTON W. HOWARD, vice-president and sales manager; AUGUST A. RICKEET, treasurer and chairman of the board, and ANDREW A. SHAFER, secretary.

A. M. BYERS CO., Clark Bldg., Pittsburgh, Pa., a concern that has been engaged in the wrought-iron industry since 1864, has just announced that, in the future, the company will manufacture steel pipe, in addition to its present line of wrought-iron products. The steel pipe will be made in the company's modern pipe mills under the same executive supervision as is now applied to wrought-iron pipe.

OSBORN MACHINE CO., DuBois, Pa., announces the opening of a Pittsburgh sales office at 820 Empire Bldg., with C. K. WEHN in charge as general sales manager. Mr. Wehn was formerly sales manager of the Pennsylvania Fabrication Co., Pittsburgh, Pa. The company also announces the appointment of JAMES J. ZIMMERMAN as works manager. Mr. Zimmerman was formerly production manager of the Elliott Co., of Jeannette, Pa., and assistant general superintendent of the Scott Foundry, Reading Iron Co., Reading Pa.

## Rhode Island

GEORGE G. PRAGST, after thirteen years' association with the Franklin Machine Co. of Providence, R. I., has opened a sales office in Pawtucket, R. I., for machinery, machine tools, and hardware. Mr. Pragst has space at the plant of the Lincoln Machine Co., 260 Esten St., Pawtucket.

## Wisconsin and Michigan

WROUGHT WASHER MFG. CO., Milwaukee, Wis., manufacturer of washers and stampings, is expanding its range of service in California and the adjacent territory through its Los Angeles sales

agent, the WESTERN WASHER & MFG. Co., now located in new quarters at 2111 E. 51st St., Los Angeles, Calif. The new plant has much enlarged and improved production facilities and warehouse space.

LINK-BELT Co., 910 S. Michigan Ave., Chicago, Ill., has appointed the CHADWICK MACHINERY Co., Milwaukee, Wis., distributor of Link-Belt crawler shovels, cranes, draglines, and locomotive track type cranes.

FOUR-WHEEL DRIVE AUTO Co., Clintonville, Wis., has appointed CHESTER J. ROBERTS assistant general manager and ROBERT C. GEFFS assistant sales manager.

CARBORUNDUM Co., Niagara Falls, N. Y., has purchased the personal assets and good will of the HUTTO ENGINEERING Co., Inc., Detroit, Mich., manufacturer of cylinder honing and grinding tools and machines. The operations of the Hutto Engineering Co. will be continued at the present plant at 515 Lycaste Ave., Detroit, Mich., as a new division of the Carborundum Co., to be known as the Hutto Machine Division of the Carborundum Co. The present management is being continued. JOSEPH A. CARLIN has been made manager, and JOHN E. KLINE chief engineer of the division.

## COMING EVENTS

SEPTEMBER 9—Annual meeting of the ASSOCIATED MACHINE TOOL DEALERS at the Hotel Cleveland, Cleveland, Ohio. Harry Barney, secretary, Koppers Bldg., Pittsburgh, Pa.

SEPTEMBER 11-21—MACHINE TOOL EXPOSITION to be held in Cleveland, Ohio, under the auspices of the National Machine Tool Builders' Association, 1220 Guarantee Title Bldg., Cleveland, Ohio.

SEPTEMBER 18-19—Production Meeting of the SOCIETY OF AUTOMOTIVE ENGINEERS to be held at the Hotel Statler, Cleveland, Ohio, in connection with the National Machine Tool Show.

SEPTEMBER 18-20—Convention of the NATIONAL INDUSTRIAL ADVERTISING ASSOCIATION at Pittsburgh, Pa.; headquarters, William Penn Hotel. Further information can be obtained by addressing W. J. Ramsey, Industrial Advertising Council, P. O. Box 1198, Pittsburgh, Pa.

SEPTEMBER 30-OCTOBER 4—NATIONAL METAL EXPOSITION AND CONGRESS under the auspices of the American Society for Metals to be held in the International Amphitheatre, 43rd and Halsted Sts.,

Chicago, Ill. W. H. Eisenman, secretary, American Society for Metals, 7016 Euclid Ave., Cleveland, Ohio.

OCTOBER 14-15—Eighteenth semi-annual meeting of the AMERICAN GEAR MANUFACTURERS' ASSOCIATION to be held at the General Brock Hotel, Niagara Falls, Canada. J. C. McQuiston, manager-secretary, Penn-Lincoln Hotel, Wilkinsburg, Pa.

NOVEMBER 18-20—Twenty-second NATIONAL FOREIGN TRADE CONVENTION of the National Foreign Trade Council in Houston, Tex. Secretary, Lindsay Crawford, National Foreign Trade Council, 26 Beaver St., New York City.

DECEMBER 2-7—FIFTEENTH EXPOSITION OF CHEMICAL INDUSTRIES at the Grand Central Palace, New York City.

## OBITUARY

FREDERICK HART, founder and past-president of Frederick Hart & Co., Inc., Poughkeepsie, N. Y., manufacturers of special machinery and tools, died July 24.

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## Treating Metallic Surfaces to Resist Wear and Corrosion

Two methods of preparing metallic surfaces against the ravages of wear and corrosion were recently announced by Colmonoy, Inc., Los Nietos, Cal. One method, which is known as the "sweat on," is to mix metallic boron crystals with sodium silicate (water glass) so as to form a stiff paste. This paste is covered over the surface to be processed to a thickness of from 1/16 to 1/8 inch. Heat is then applied by means of an oxy-acetylene torch, a carbon arc, or an atomic hydrogen torch until the crystals sink into the parent metal. After such processing, the parent metal can be formed or forged without disturbing the wear- and corrosion-resistant covering.

A second method, which is used when a smooth or ground and polished surface is required, is designated as the "cast on" process. In this process, metallic boron crystals are held in a matrix of nickel alloy which has a lower melting point than steel. The alloy is melted and poured with the boron crystals to fill any desired space between a copper or cast-iron mold and the metal on which the wear- and corrosion-resistant surface is desired.

## NEW BOOKS

A BIBLIOGRAPHY ON THE CUTTING OF METALS—PART II. By Orlan W. Boston, Director of the Department of Metal Processing, University of Michigan. 202 pages 5 1/2 by 8 1/2 inches. Published by Edwards Bros., Inc., Ann Arbor, Mich. Price, \$2.50.

The second part of this Bibliography on the Cutting of Metals is a most valuable continuation of Part I, previously compiled by Professor Boston and published in 1930 by the American Society of Mechanical Engineers. The present compilation contains a record of the material that has been published on the subject during the last five years, containing 1257 new references, indexed by author and subject.

INTRODUCTION OF NEW INDUSTRIAL PRODUCTS. By O. C. Holleran. 23 pages, 8 by 10 1/4 inches. Published by the Bureau of Foreign and Domestic Commerce of the Department of Commerce, Washington, D. C. Price, 5 cents.

This pamphlet is the sixth in a series on market research. The study has been undertaken with the aim of assisting American industry to avoid waste. It lists the essential factors to be considered in bringing out any new industrial product, and includes a check sheet containing definite questions to be answered prior to making a capital investment in a new product.

STRESS CONCENTRATION AT FILLETS, HOLES, AND KEYWAYS AS FOUND BY THE PLASTER-MODEL METHOD. By Fred B. Seely and Thomas J. Dolan. 34 pages, 6 by 9 inches. Published by the Engineering Experiment Station, University of Illinois, Urbana, Ill., as Bulletin No. 276. Price, 40 cents.

AMERICAN STANDARD DRAWINGS AND DRAFTING-ROOM PRACTICE. 24 pages, 8 by 10 1/2 inches. Published by the Society for the Promotion of Engineering Education and the American Society of Mechanical Engineers, 29 W. 39th St., New York City. Price, 50 cents.

INDUSTRIAL MACHINERY IN PRINCIPAL FOREIGN COUNTRIES, 71 pages, 6 by 9 inches. Published by the U. S. Department of Commerce Washington, D. C., as Trade Information Bulletin No. 825. Price, 10 cents.

AMERICAN STANDARD SHAFTING AND STOCK KEYS. 8 pages, 8 by 10 1/2 inches. Published by the American Society of Mechanical Engineers, 29 W. 39th St., New York City. Price, 45 cents.